charges made by the Western Electric Company for its equipment engineering specifications and for installing central office equipment in plants of the various Bell associate companies and with what such charges included from time to time.

I am familiar with sheet 2 of Defendants' Exhibit X-13, which attempts to make a comparison between the equipment engineering and installation prices of both manual and dial equipment used by Mr. Sloan in his appraisals and with certain indices taken from an index number study of Mr. R. W. Burgess. I heard Mr. Sloan's testimony in this connection as to how he had figured his installation cost in connection with manual and dial equipment in Chicago.

I furnished to Mr. R. W. Burgess, the Chief Statistician of the Western Electric Company, the material which he used in compiling his index numbers so far as installation and equipment specifications prices are concerned. The index numbers, which I furnished, reflected the trend of prices of that work for the Bell associate companies.

During the period under consideration, 1923 to 1931, there has been a gradual transfer of installation work from the field to the factory which has contributed substantially to reducing the installation prices as reflected in the Burgess trend. This transfer of installation labor from field to factory has affected both manual and panel installations, but it has affected the panel installation to a greater extent than the manual.

In the earlier panel installations, such as State-Central and Superior offices in Chicago, it was the practice at the shop to perform only a minor test on the wired equipment. It was then necessary for the installer to perform a detailed operation test on the equipment, involving considerable installation labor, and also the use of expensive equipment. On the later jobs the shop performs this detail operation test, thereby insuring that the equipment was in operating [fol. 7065] condition when it was shipped, and this has provided a very much more accurate test of the complicated circuits involved. It was then necessary for the installers only to perform a simple inexpensive routine test on the equipment to insure that no defects had developed during transit or installation. That resulted in lower installation cost in the field and, probably, higher material cost in the factory.

On the earliest jobs, the shop only assembled and wired the equipment on the selector frames, leaving to the installer the job of assembling and wiring this equipment on the sender and test frames.

In our earlier panel jobs, such as State-Central and Superior, it was necessary for the installer to perform the cabling and connect all of the apparatus mounted on the relay rack. He also performed an operation test to insure that the equipment functioned satisfactorily. To a very large extent this apparatus is now mounted on the relay rack units in the shop. It is there given an operation test, thereby insuring that it is in operative condition when it is shipped. It is then necessary for the installer only to connect the cabling to the terminal strips at the top of the unit, and perform a minor routine test to insure its functioning satisfactorily.

In arriving at my price trends for internal uses and in determining reductions made in installation prices, I dealt with this situation just as I found it except to exclude the effect of design changes. The Burgess index numbers, so far as installation prices and equipment engineering specifications are concerned, in no way indicate anything to the contrary of what I have just said.

With respect to the installation prices on manual central office equipment, there have been factors which affected reduction of such costs in one or more types of such equipment more than in others. The Number 1 Western Electric Company switchboard was introduced into general use at least twenty years prior to the beginning of this period under consideration. By 1923 the installation work on this equip-
[fol. 7066] ment had reached a high degree of efficiency, and very little improvement in that efficiency was made after that time, affecting installation prices. On the other hand, the Number 11 switchboard was introduced during the early part of this period, and very considerable economies were made in the installation work on that equipment. Furthermore, there was a marked increase in efficiency in the repeater equipment. Both of these were included in the Burgess price trend studies.

The transfer of a portion of installation labor from field to factory has affected equipment engineering specification prices. It has had the effect of reducing the prices of equipment specifications, because it has permitted the Bell asso-

ciate companies to order the equipment in standardized units, thereby reducing the engineering effort and price. The conditions which brought about increased efficiency in installing the new Number 11 manual switchboard and manual repeater installations has affected our manual equipment engineering specifications price. The equipments referred to were comparatively new, and as time went on we were able to make considerable economies in the prices.

This transfer of a portion of installation labor from field to factory has been going on continuously during this period, but more actively during the middle years of the period. The trends shown on page 2 of Exhibit X-13 are not trends of comparable situations.

I doubt if all of the data and information necessary for a study to obtain a trend on a comparable basis with the Sloan appraisal for installation labor and equipment engineering prices, is available. It would be necessary to ascertain the prices of equipment specification and installation on a large number of manual and panel installations, and then apply the current price information to each of those installations for each of the subsequent years. It would take at least five men working continuously for a year, I would imagine, to prepare such a study. The Western Electric Company has never made such a study.

[fol. 7067] ALLEN G. HOYT, recalled as a witness on behalf of the plaintiff in rebuttal, having been previously duly sworn, further testified as follows:

Direct examination.

By Mr. Blackman:

June 30, 1932.

I am the same Mr. Hoyt who testified previously in this case. I have examined Defendants' Exhibits X-227 to X-259, inclusive.

"Q. Referring to the comparisons set up in Exhibits X-227, X-228 and X-229, in your opinion are those comparisons appropriate to prove anything of value in determining the fair rate of return to the American Telephone and Telegraph Company or the Illinois Bell?

"Mr. Goldstein: I object to the form of the question.

"Judge Wilkerson: The objecton is sustained. It is not for him to say whether they are valuable. He can criticize them, and give his opinion on the subject himself, but I do not think he can characterize them."

Those exhibits indicate the cost of certain bond financing, in the rate of return to the Bell System, as compared with the cost of bond financing for certain railroads and public utilities. The spread paid by the Bell System in its bond financing was relatively small, because it issued only high-grade bonds; that is, those rated Triple-A, or Double-A. In selling bonds of high quality, the selling resistance is low and therefore the bankers are able to underwrite issues on a relatively low margin, whereas lower-grade bonds are usually more difficult to sell; they usually require more expense in merchandising, and therefore require a higher margin of profit. Therefore the comparison in these exhibits is in my opinion of practically no significance.

"Mr. Goldstein: I move to strike out the answer, that it is of no significance.

"Judge Wilkerson: The objection is sustained. Strike [fol. 7068] out what he says about it being of no significance. That is for the Court. He can tell what the exhibit shows."

The average yield on a miscellaneous assortment of bonds, that is to say, rating from high down to a medium or low grade, would naturally be higher than the yield on an assortment of bonds confined to the high rating; that is to say, rated Double-A or Triple-A. In this comparison, the Double-A bonds and Triple-A bonds of the Bell System are compared not only with bonds of similar rating, but with bonds of all classes.

"Mr. Blackman: Now in your opinion, is the effect upon the value of the comparison of the matters which you have just stated?

"Mr. Adcock: We object to the question.

"Mr. Goldstein: It is not for this witness to say what value the exhibits have.

"Judge Wilkerson: If he is being examined as an expert, it is necessary to put to him a hypothetical question, which includes all of the elements. He may not give an opinion as an expert in which he assumes these facts about the Bell Companies, unless they are all incorporated——

"Mr. Blackman: He is only assuming——

"Judge Wilkerson (continuing): —in the question, because——

"Mr. Blackman: He is only assuming the facts which he has stated, and sees on the face of the exhibit.

"Judge Wilkerson: I sustain the objection to that.

"Mr. Blackman: Mr. Hoyt, in your opinion are the facts which are shown in the comparison which we have referred to, sufficient to furnish a proper basis for making the comparison?

"Mr. Goldstein: I object to the question on the same ground.

"Judge Wilkerson: Is that not the same thing again, in just another form?

"Mr. Blackman: It is a very customary form of interrogating a witness——

"Mr. Goldstein: Well——

[fol. 7069] "Mr. Blackman: —in matters of this kind. I cannot see how else you can really get at it.

"Judge Wilkerson: I do not think it is proper, but if you press the question, I will take his answer. I will not deprive you of a record. I will take it subject to the objection. I do not think it is proper, myself.

"Mr. Blackman: Well, then, I will withdraw it.

"Judge Wilkerson: There are several things—either this witness is being examined as an ordinary witness, or he is being examined as an expert.

"Mr. Blackman: Surely.

"Judge Wilkerson (continuing): Now, if he is being examined as an ordinary witness, he testifies to the facts about the Bell financing——

"Mr. Blackman: Yes.

"Judge Wilkerson: —and he testifies to the facts of the financing of these other companies.

"Mr. Blackman: Yes.

"Judge Wilkerson: Now, if he is testifying as an expert, the question should be so framed that you are not examining him at the same time as an ordinary witness——

"Mr. Blackman: No, sir.

"Judge Wilkerson: —while he is testifying as an expert.

"Mr. Blackman: I am examining him solely——

"Judge Wilkerson (continuing): So that if he is testifying as an expert——

"Mr. Blackman: I am examining him solely as an expert, and I am asking for his opinion as to the effect of the things he sees before him. Of course, you cannot put a hypothetical question in a matter of this kind, because there is no hypothesis; the thing is there, it is actual; and I am simply asking him whether those things give him as an expert enough information to determine anything.

"Judge Wilkerson: I will take his answer subject to the objection. What is your answer?

"The Witness: Will you just read that question to me again, please?

(Read by the Reporter.)

[fol. 7070] "Mr. Adcock: What facts?

"A. I think not.

"Mr. Goldstein: Yes, what facts?

"Mr. Blackman: He has just mentioned the facts.

"Judge Wilkerson: I am taking the answer in order that the record may be made here. I have told you what I think about it. Go on. Answer the question."

I think not because the classification of bonds into different ratings is not rigid. Because two bonds are rated Triple-A does not mean that they are identical in security, and would command identically the same price yield on the market. A very large number of bonds are rated Triple-A; naturally, some are better security—have better security than others. The comparison of Triple-A bonds of one corporation with the Triple-A bonds of another corporation proves little in my own opinion, unless all of the pertinent and relative facts regarding each security are available.

"Mr. Goldstein: I move to strike out the answer as not responsive to the question.

"Judge Wilkerson: The record will show your motion.

"Mr. Adcock: And also——

"Judge Wilkerson: The ruling is reserved—what is it?

"Mr. Adcock: —particularly the statement that it proves little, and what follows.

"Judge Wilkerson: Yes. The record will show your objection."

One of the comparisons I have referred to is a comparison between an indiscriminate lot of railroad and utility bonds ranging from Triple-A down to BAA.

"Q. And they are averaged and compared with the average of the Bell System bonds. In your opinion, is that a proper comparison to make?

"Mr. Goldstein: I object to the question.

"Judge Wilkerson: The record will show the objection, and the same ruling. Go ahead.

"A. I think the comparison has little bearing on the situation.

[fol. 7071] "Judge Wilkerson: Well, what situation now are you talking about?

"The Witness: On the question of determining what is a reasonable rate of return.

"Mr. Goldstein: That is a question of law.

"Judge Wilkerson: There are a good many things to be taken into consideration in determining a reasonable rate of return——

"Mr. Blackman: Does it have——

"Judge Wilkerson (continuing): —and it is conceivable now that a table made up on the basis of bonds of entirely different classes of Triple-A bonds might throw some light on the subject. But it does not seem to me that it is for this witness to tell the Court whether it throws any light or not.

"Mr. Goldstein: No.

"Mr. Blackman: He is only——

"Judge Wilkerson: However, I will take the answer. I was merely indicating to you——

"Mr. Blackman: Yes.

"Judge Wilkerson: —that I do not think the Court is bound by the opinion of this witness on this subject.

"Mr. Adcock: And we move to strike out the answer.

"Judge Wilkerson: But he can say, and he has said, that a table that is made up on a mixed basis like this, will show —or tables made up on that basis will show many results dependent upon the particular bonds which are included.

"Now, whether they throw any light on what the Court shall say in this case as to rate of return, is an entirely different question. It may be that the Court in arriving at or in determining what is a fair rate of return, on this kind of property, should compare this property with other

properties, and it may be something that may enter into arriving at a conclusion.

"Mr. Blackman: Yes, sir.

"Judge Wilkerson: But that goes to the question——

"Mr. Blackman: And all we are doing is giving the Court the benefit of this man's expert opinion.

[fol. 7072] "Judge Wilkerson: —as to whether it is material——

"Mr. Blackman: Yes, sir, as to whether——

"Judge Wilkerson: —as to whether it throws any light on the subject——

"Mr. Blackman: As to whether it is appropriate.

"Judge Wilkerson: —would seem to me not to be a matter for expert testimony.

"Mr. Blackman: All right, sir.

"Mr. Adcock: May we have the answer stricken out?

"Judge Wilkerson: Well, the motion shows—is shown on the record; the record shows your motion.

"Mr. Adcock: Very well.

"Judge Wilkerson: Go ahead. I will let you make a record on this, Mr. Blackman.

"Mr. Blackman: All right, sir.

"Judge Wilkerson: His answer will be received subject to the objection, and subject to the motion to strike it out.

"Mr. Blackman: All right.

"Mr. Adcock: And will the record be made in the nature of an offer of proof——

"Judge Wilkerson: No.

"Mr. Adcock: —in this respect.

"Judge Wilkerson: I will let him put the question to the witness.

"Mr. Adcock: And we object.

"Judge Wilkerson: And let you object, and let the record show your objection, and let the witness answer the question, and let the record show in each case your motion to strike.

"Mr. Adcock: Very well.

"Judge Wilkerson: So that it will all be before the Court when it comes down for final determination. I think that is the quickest way to get it.

"Mr. Adcock: Very well.

"Mr. Blackman: Now, Mr. Hoyt, in Defendants' Exhibit X-236, comparison is made of Bell System bonds of certain

grades with bonds of corresponding grades of railroads, public utilities, and industrial companies. In your opinion, [fol. 7073] does that comparison furnish any basis for determining relative marketability of the bonds dealt with?

"Mr. Adcock: Objection.

"Mr. Goldstein: We object to that.

"Mr. Adcock: May our objection go to the same line of questions——

"Judge Wilkerson: The record will be made, as to the entire line of questions.

"Mr. Adcock: All right.

"Judge Wilkerson: I am doing that in order to save time. Go on.

"A. I think not."

It is an attempt, it seems to me, to compare things that are not similar. The bonds of the Bell System have a certain classification as to security, and a certain credit standing. The other bonds in some cases are of different classes of corporations and of different rating. The security varies, while the security of the Bell System bonds is very high. The security of a miscellaneous assortment of bonds may be high, or may be medium.

"Mr. Adcock: I want to move to strike out that portion of the answer as to bonds having certain classifications.

"Judge Wilkerson: The record will show——

"Mr. Adcock (continuing): You cannot tell what the witness is referring to.

"Judge Wilkerson: The record will show your motion."

What I referred to was this: The exhibit shows railroad bonds, public utility bonds and industrial bonds. Those are different classifications, in the character of the issuing corporation. With a railroad or an industrial bond, the measure of credit of the railroad or the industrial may be quite different from the measure of credit of the telephone company. There is a variation in the character of the corporation and there is of course a very material variation in the security behind the bonds—bonds having the same rating. In my opinion the same holds true with regard to the comparison set up with regard to X-238, X-239, X-240, X-241, X-242, X-243, X-244, X-246, X-247, X-248 and X-249.

[fol. 7074] "Q. Now, in X-250 a comparison is made between what is called the average yield on common stocks,

and what is called the average yield on bonds. In your opinion, is that a proper comparison to make, to prove any facts of value in connection with the marketability of securities, or rate of return, to the American Company or the Illinois Bell?

"A. It is not.

"Q. Why not?

"Mr. Adcock: We are asking that the same objection apply to this same line of questions.

"Judge Wilkerson: Yes."

The primary consideration which is effective in determining the market value of a stock is not merely the yield on dividends paid. The earnings per share are a much more important factor in determining the market price than the dividends actually paid. For that reason, the yield of a common stock based on the dividends paid at any particular time has far less significance than the earnings per share of the stock at that particular time. I think the same is true with regard to X-251, X-252, X-257 and X-259.

X-259 is a tabulation showing the high and low price at which American Telephone and Telegraph Company common stock sold in the years from 1901 to 1931 inclusive. And then there is another column showing the rate of dividend paid on that stock during each year. Then there is another column showing the yield of the stock at each of the high and low prices, based on the dividends paid for that particular year, and then there is another column giving the average of these two yields for each of these years. In this tabulation (A-260) I have taken the high and low prices of American Telephone and Telegraph Company stock for the years 1921 to 1928, inclusive, from X-259. I have assumed they were correct. Next, I have had prepared the earnings of the American Telephone and Telegraph Company per share annually calculated for those years that I have used. Then I have shown the percentage of these earnings upon the market price of the stock, the [fol. 7075] high and low of each year. That is, I have proceeded precisely as Mr. Hammond proceeded in the city's exhibit, except that I have substituted for the dividend payments made by the company, the annual earnings per share of the company. The last column shows the average of these percentages calculated in a similar way to the average

yield in the exhibit. I carry this tabulation only through the year 1928 because in the year 1929 the stock of the American Telephone and Telegraph Company sold at such a price that it indicates that the purchaser was not interested primarily in the yield of the stock at that particular time. It was, as we know, a period of enthusiastic optimism, and the stock was purchased by people who it is quite evident anticipated a return in appreciation very much in excess of the yield of the stock at the prices ruling. The yield of the stock or the dividend paid, or the dividends likely to be paid in the near future during that year, was lower than could have been obtained on the senior obligations of the company, namely, on bonds, and it is quite evident that the purchaser of the stock during those years was not primarily concerned with the yield of the stock from the dividends paid or likely to be paid during the next few years.

(Plaintiff offered sheet marked Exhibit A-260 in evidence.)

The condition that I have described as existing in 1929 existed to a substantial extent in 1928 also at the time when the stock sold at the highest price, during 1928.

The dollars per share earned annually shown on this sheet do not include the $48,000,000 dividend paid by the Western Electric Company in 1927. They do not include the undistributed profits of the Western Electric Company. The inclusion of those figures would show a higher percentage return in the last column.

In my opinion the average percentage of return shown on this sheet does not indicate the full amount of return that would be required to finance the American Company. The price at which stock sells from time to time in the open market is no indication of what price a large block of stock [fol. 7076] would have to be sold at in order to have it subscribed by the stockholders to whom it might be offered. When one individual sells a block of shares of a company to another individual, there is no additional capital enlisted in the industry. On the other hand, when a company desires to attract additional funds, for its purposes, by offering a new block of stock, then there is enlisted further capital for that particular corporation. For instance, in 1930, the American Telephone and Telegraph Company offered, as I recall it, over $250,000,000 worth of stock at par. Nat-

urally, the stockholders who subscribed for that stock did not at the time the stock was first offered, have on deposit, $250,000,000. Many subscribers must have sold other securities in order to exercise their subscription rights. Other stockholders must have arranged to go into debt to take up their shares of the stock. The price at which an additional large block of stock may be issued by the company is invariably, I believe, below the price at which the stock may have been ruling just prior to the time of the offer.

"Q. Now, Mr. Hoyt, referring to Exhibit X-229, you find there an average worked out for the Bell System, for cost of its bond money, of 5.62 for the years 1921 to 1931, and 5.44 for the years 1923 to 1931,—does that fact furnish any indication as to what rate of return is necessary to attract capital to a venture such as that of the American Telephone and Telegraph Company?

"Mr. Goldstein: We object to that question.

"Judge Wilkerson: He may answer the question subject to the objection. There will be the same arrangement about the record."

The exhibit shows that the average cost of bond money for the Bell System was approximately 5.5 per cent. The average from 1921 to 1931 was 5.62; the average from 1923 to 1931 was 5.44. This indicates that if the bond money, having in mind the fact that the bond debt of the company is less than one-quarter of its total assets—if its bond money cost it about 5.5 per cent, it indicates to me that in order [fol. 7077] to obtain all of the money needed, the balance having been derived by the issuance of stock, the total return on all capital invested in the enterprise would have to be approximately 8 per cent, inasmuch as the risks and hazards undertaken by the stock purchasers were of course very much in excess of the risks taken by the bondholders, who had a first lien on the property in an amount representing a very small proportion, a very moderate proportion, of the total assets.

Cross-examination.

By Mr. Goldstein:

I had Exhibit A-260 prepared. The figures in the second column entitled "Dollars per Share Earned Annually"

were provided by the Comptroller of the American Telephone and Telegraph Company. I know what the dollars per share earned annually is intended to cover. It is intended to cover the earnings of the telephone companies on the consolidated basis, showing the earnings of the subsidiary applicable to the stock of the parent corporation. It includes in other words undistributed earnings of the subsidiaries in excess of the amount actually paid by such subsidiaries in dividends to the parent corporation, excluding of course the excess of the Western Electric Company. Deduction is made for minority interests. It is, I believe, a true picture of the earning power of the stock of the American Telephone and Telegraph Company except for the exclusion of the Western Electric Company surplus earnings.

"Mr. Goldstein: Now, am I to understand that the second column in 260 covers—comes from CR-53, is that correct?

"Mr. Blackman: Yes, I understand that is the source."

If I were getting a true picture of the earnings of the American Telephone and Telegraph Company, I would take the earnings and the undistributed earnings from all of the subsidiaries. I omitted the undistributed earnings of the [fol. 7078] Western Electric Company and its subsidiaries, simply because it seemed to be a custom of the company to treat that as an investment, and not as a telephone operating property. They include in their earnings, in that particular company, only the dividends received by the American Telephone and Telegraph Company. From an investment standpoint, if you were to figure the value of securities as having a bearing on the price, the investor would take into account also the fact that there were additional earnings that the American Telephone and Telegraph Company had that it did not disclose in its earnings statement.

"Q. So that you would consider all of the profits of the Western Electric Company, and all of the profits of all of the subsidiaries of the Western Electric Company, and their sub-subsidiaries.

"A. I would give consideration——

"Q. Is that correct?

"A. (Continuing): —to the fact that that was in effect, an understatement of the earning power."

A-260 is really not a full statement of all of the earnings. It is just a partial statement. The footnote that it does not include the dividend of $48,000,000 and the undistributed profits of the Western Electric Company; that is the undistributed profits of each year.

"Mr. Blackman: I understand there is no objection to Exhibit 260.

"Mr. Goldstein: None at all."

(The document was thereupon received in evidence, marked Plaintiff's Exhibit A-260.)

[fol. 7079] F. M. Williams, recalled as a witness on behalf of the plaintiff, having been previously duly sworn, further testified as follows:

Cross-examination.

By Mr. Goldstein:

June 30, 1932.

On direct examination I spoke of the trend shown on page 2 of Exhibit X-13, and Mr. Sloan's trend with respect to installation cost of equipment specifications, as not being comparable. They are not comparable in the following respect: I understood that Mr. Sloan took the equipment as it was shipped originally, and carried it on from year to year on the same basis. We prepared our trend information on the basis of the manner in which the installation work was being done, year by year.

R. H. Gregory, recalled as a witness on behalf of the plaintiff, having been previously duly sworn further testified as follows:

Cross-examination.

By Mr. Goldstein:

June 30, 1932.

"Q. Mr. Gregory, on direct examination you spoke of notes payable as not being properly deductible even if they were for short periods, and you said these notes payable were not given for merchandise. If the notes payable had been given for merchandise would they be deductible?"

I think the notes payable would be deductible if they were for a short period. If they were for merchandise over a long period of time I would question whether they would be deductible. The difference there would be the question of the length of time.

Now, suppose we gave a note to a bank for 30 days, to pay taxes, or to provide money to pay taxes, or to pay payrolls. I would not deduct that note because at the particu- [fol. 7080] lar period when we were making bank loans, or borrowing from banks, it was more or less of a continuous process; we were paying them off in some months, and then we were borrowing in other months; and I think it is perfectly fair to take the average condition outstanding, on that particular item.

The reason why I would not make any deduction for the notes payable was that the money represented by them was included in the business, and at the risk of the business. I think the loan for temporary working capital and the note which is given for merchandise, and the merchandise used in the business are both at the risk of the business. The determining factor is more the time element, and also the risk; they are both at the risk of the business. By "time element" I mean if the time element is a month or so, I would say that would be considered more as a current payable, and deductible; but if it is more than a month, if it was a continuing process of borrowing money from the banks, the average condition of such a situation could be considered properly as money invested in the business and at the risk of the business.

Exhibit A-253 is entitled "Information submitted to counsel for the City of Chicago March 14, 1932, to June 15th, 1932". That is in the same form as, and a continuation of, A-73. The same sort of condition applying to A-253 with reference to the various items would apply also to all of the items I furnished; that is some of them were made up specially, some of them were already prepared, and some of them had been prepared for other cases.

Gregory's Exhibits 1 and 5, referred to in the correspondence and motion in this case are the same as Exhibits A-77 and A-79 in this case.

I was asked regarding Defendants' Exhibits X-294 and X-295, and I gave the financial history of the Western Electric Company up to 1920. In 1915 there was outstanding $15,000,000 aggregate par value common stock of the Illi-

nois Corporation. Of the $15,000,000, $6,250,000 had been paid in in cash from 1881 up to 1915. The total capital [fol. 7081] and surplus at the end of 1915 was approximately $40,000,000. The New York Corporation paid for the assets of the Illinois Corporation. It paid to the stockholders 150,000 shares of 6 per cent preferred stock of the New York Corporation and redeemable at 120.

The fact is that a man who was a stockholder in the Illinois Corporation and owned one share of stock in the Illinois Corporation received therefor one share of preferred stock of the New York Corporation and one share of the common stock of the New York Corporation. He received it for the surrender of that stock. The New York Corporation turned over to the stockholders, for each share of common stock in the Illinois Corporation, one share of preferred stock and one share of common. That preferred stock was redeemable at $120. In 1917 the New York Corporation issued again $15,000,000 worth of preferred stock and it was subscribed for at par. That was likewise redeemable at $120 per share.

In 1920, thirty million dollars of preferred stock was retired at $120 per share and two hundred thousand shares of common stock were issued at $180 per share.

I said that the exchange was made on March 9th under two separate resolutions. One resolution called for the redemption of the preferred stock at 120 and the other for the issuance of the common stock to the common stockholders in the ratio of 4 shares to 3. I spoke yesterday of the effect of that transaction as merely being a transfer, and not a cash redemption, and not a transaction of the purchase of the stock. I was speaking from the point of view of the Western Electric Company and I was speaking also from the point of view of the American Telephone and Telegraph Company. The American Telephone and Telegraph Company had something like 297,000 shares of preferred stock, and they received in payment therefor the common stock without the payment of or transfer of one dollar in cash.

I do not know the accounting procedure followed by the American Telephone and Telegraph Company in connection [fol. 7082] with this transaction. I have never seen the books, or any records of the American Telephone and Telegraph Company bearing upon this transaction. So I have no knowledge how the American Telephone and Telegraph Company treated the transaction.

I prepared Exhibit A-254. The information for this exhibit was obtained from various sources. The principal information was obtained from the records and files of the National Association of Cost Accountants. It was also obtained by telephone and from consultation with various representatives of different companies whose names are listed on this statement.

"Mr. Goldstein: We want to note an objection to this exhibit on the ground that the sources from which it is taken, are hearsay, and there is no way we can check them.

"The Witness: It is quite generally known, Mr. Goldstein, that a standard cost system is used."

I got this information from the files of the National Association of Cost Accountants, and I also got it from direct contact with the comptrollers or accounting officers of the various companies, by telephone. The National Association of Cost Accountants is an association of cost accountants, which has in its membership representatives of most of the manufacturing companies in the United States. It holds annual meetings and discusses various problems in connection with cost systems in the manufacturing business. I think they publish a list of the members. These names were taken from the files in their possession. I did not do that myself but my representatives did go to their files. Now, in just what form they found that information, I am not in a position to say at this time.

The Association is located at New York. I do not know whether they have files in Chicago similar, or not. These files that we looked at, were in New York.

"Judge Wilkerson: Well, now, let me say, if you press your objection, and you make *application to the Court to* issue a subpoena for the officers of this association to bring [fol. 7083] in their books and papers—if you press it, I will do that.

"Mr. Thompson: I understand, Mr. Goldstein, that your witness, Mr. Hagberg is a member of this Association."

(The Court stated that if the city had any difficulty about verifying the correctness of this exhibit it might renew its motion to strike.)

I spoke of the profit on the International Western Electric Company's sale being related to profits to 1882. I am familiar with the agreement for the sale of the International Western Electric Company to the International Telephone

and Telegraph Corporation which is identified as Defendants' Exhibit X-68. I am familiar with the agreement of October 1, 1925 between the Western Electric Company and the International Western Electric Company. (Defendant's Exhibit X-68-A.) I am familiar with the franchise that was given to the International Western Electric Company under these agreements, to make use of the inventions of the American Telephone and Telegraph Company and the Western Electric Company. I took all of the facts into consideration in my answer in so far as they are relevant to the point at issue.

I spoke of a claim which we made to the Internal Revenue Department in connection with the Field Examiner's inspection in 1930. I have a copy of that claim here. I do not know anything about any refusal of this document to Mr. McCann by my department; I do not think he ever asked for it. I know of a request for correspondence with the Internal Revenue Department. This is not correspondence. It was the claim made to the Field Examiner while he was right in the office. I did not consider that as coming within that request. If he had asked me for the claim, I would have been very glad to give it to him.

(The above mentioned document was identified as Exhibit A-261 and was received in evidence. The Court held that since counsel for the city had called for the production of [fol. 7084] said document it was in evidence. Defendants moved that the oral testimony of the witness be stricken because it was based on a written document.)

I spoke of the surplus adjustments of the 88 companies and stated that there was a certain effect produced by that. I have here no working papers upon which my conclusion was based. All of the working papers in that connection are simply the comptometer records, if available, of the adding up of the figures on defendants' exhibit. What we did was to add the plusses and minuses together, to get the net result, and figure out the percentage to the investment which was shown on the exhibit (I think it was A-85). That is, I took the adjustments, and added them, or subtracted them, as the case may be, whether they were red or black, for the five-year period, lumped those together and then related them to the consolidated investment for the five-year period.

I spoke of the Western Electric Company having paid actual cash for the good will of the Teletype Corporation. It

paid the cash to the owner of the stock of the Teletype Corporation at the time of the purchase. The owner at the time was the American Telephone and Telegraph Company. The American Telephone and Telegraph Company as I previously testified in detail paid for that stock by the issue of 150,000 shares of American Telephone and Telegraph Company stock, for 150,000 of the Teletype Corporation stock.

In connection with the 88 companies (Exhibit A-85), I think that in every case where good will appeared I deducted it in computing the net investment.

I do not know whether the good will in any one of those cases was paid for by the stockholders to other stockholders.

I examined X-51, X-52, X-55 and X-88. If the heading "Net profits per Exhibits A-77 and A-79" is correct on these exhibits, as I assume it is, there is no adjustment then to any of the profits shown in my exhibits.

[fol. 7085] I did not personally examine all of Mr. McCann's exhibits bearing upon the Bell and non-Bell profits, but it was done under my jurisdiction. I have seen Exhibits X-55 and X-88, where the headings appear, "The Investment Adjusted" in one column and "The Profits Adjusted" in another column. As far as the mathematics of these two exhibits is concerned, that is the additions and subtractions, I have no criticism; that is, of the particular profit columns, and so on. I am not talking now about the relations or percentages at all, nor the methods, at all.

I spoke of the 1925 cash deduction by Mr. McCann. I stated that the Western Electric earned 5 per cent. This 5 per cent was on the cash items that were included in the amount. I don't carry in mind how much it earned on the cash alone, but it would probably be the prevailing amount allowed by banks at that time for money on deposit.

CR-714 of the Western Electric, which is X-200, does not show all of the cash and cash items. As far as cash is concerned it shows the rate of interest received on all the cash of the Western during 1925.

Mr. McCann deducted not only cash, but the cash items as well. This twenty million dollars he deducted was cash and cash items. My criticism of his deduction and his inclusion of 2.5 per cent interest is based upon my understanding that what he deducted was cash and cash items in the amount of twenty million and not cash alone.

I criticised one of Mr. McCann's exhibits where he had combined Chrysler and another corporation to show the

turn-over. I stated it had no application to A-77 and A-79 and A-80. What I was talking about is the turn-over for the various classes which we discussed at some length in March. They were the three classes, telephone apparatus, lead-covered cable, and special commercial products or appliances, as you have described them. When I said on direct examination, yesterday, that the turn-over was the same for Bell and non-Bell business, I did not have in mind all the telephone apparatus (including commercial products) sold to Bell customers, on the one hand, and all the telephone [fol. 7086] apparatus (including commercial products) sold to non-Bell customers, on the other hand. I had in mind telephone apparatus by itself, and special commercial products, or appliances, in another class by itself. I treated them by separate classifications.

I spoke of Mr. McCann overstating the profits of the Bell business for the earlier years by a million and a half, because of something that he had done with reference to pension accruals. That million and a half was over a period of years prior to 1925. The composition of that million and a half by years is as follows: In 1916, $62,000; in 1917, $103,000; in 1918, $82,000; in 1919, $109,000; in 1920, $255,000; in 1921, $213,000; in 1922, $265,000; in 1923, $363,000; in 1924, $30,000.

The aggregate is 1,482,000. I used the round figure of a million and a half dollars.

In connection with A-256, "Average Notes Payable": the Western Electric, in its income account in its annual reports, treats interest on loans made to subsidiary companies as income. I treat only the interest and whatever dividends are received as income. All there is, of course, on loans in the way of income is the interest. The only income that we show from loans is the interest paid by the subsidiary to the Western Electric Company; that is the only possible income that can be obtained.

I spoke about delivering to the defendants in December a consolidated statement with a notation that it was temporary, and that it was subject to check. The document which I delivered in December was similar to A-84, and contained only three lines, in addition to the heading. One entitled, "Net profits", and the other, "Average investment", and the other, "Per cent return on investment". Exhibit A-84, and the sheet which I gave defendants in December covered the consolidated earnings of the Western Electric

and all of its subsidiaries. It covered all of Western's subsidiaries for the period from 1916 to 1931, inclusive, with the year 1931 on an eight months' basis, raised to a twelve months' basis. Those subsidiaries included not only the American subsidiaries, but the foreign subsidiaries and the Canadian subsidiaries, to the extent that we owned an in-
[fol. 7087] terest. The underlying papers on this consolidated statement were in the hands of our auditors until about February 11, when it was turned over to representatives of the defendants.

When, in connection with D-61 I spoke of 85% of the information having been made available to defendants, I meant that the information for the period from 1916 to 1931 was made available, and the profits of that period represented 85 per cent of the profits of the entire period.

"Q. You spoke of some document having been copied by our representative?

"A. Yes.

"Q. Where were you on May 6, 7, 8 and 9, Mr. Gregory? As a matter of fact, you were in New York?

"A. Yes; I got out here on the 13th.

"Q. Yes.

"Mr. Thompson: Is it denied that that was copied?

"Mr. Goldstein: Well, I certainly do not intend to have the record show as it now stands, and I would like to have the witness on because the delivery of those documents have something very important attached to them. When the documents were delivered, and the representative came to my office in connection with that, we wrote the letter that the information was not what we wanted. Now, the record as it now stands would seem to appear that we got everything we wanted, so Mr. Gregory's statement is on hearsay, and I would like to have somebody who will give the whole transaction.

"Mr. Thompson: Do we have to waste the time of the Court, if you admit that your representative did make a copy of the information?

"Mr. Goldstein: I will admit that the representative made a copy of the letter which is referred to in our Exhibit X-344, and is the document referred to in the letter of May 31, 1932, addressed by me to Mr. Bracelen; if you will stipulate to that I am perfectly agreeable to have the record stand as it is.

"Mr. Thompson: Let's see it.

[fol. 7088] "Mr. Goldstein: That refers to the same matter.

"Mr. Thompson: Yes. Well, we will see about that later. There is no use stopping now about it.

"Mr. Goldstein: All right; I just wanted to know.

"Mr. Thompson: I know you got the copies, and if necessary, I will call the witness.

"Mr. Goldstein: All right. But I want to show that the document that I was referring to—that Mr. Gregory has referred to, is a document that was delivered here in Chicago, that Mr. Gregory knows nothing about excepting by hearsay.

"Judge Wilkerson: If he knows nothing about it, why ask him about it?

"Mr. Goldstein: But he made the statement it was delivered. I will have the answer stricken, as being based on hearsay.

"Judge Wilkerson: Do you know anything about it?

"A. Yes, I do know something about it."

I was here May 13th. As I recall, to the best of my recollection, we first sent to defendants a statement analyzing the data by years, which they said was not what they wanted. Then they asked for the underlying data back of that. And I was in Mr. Thompson's office at the time when we decided to send that document over to them and give them a chance to copy it. I know that it went over to them. Now, as to whether it was copied or not, I wasn't there, I was not present when they copied it. I know it was sent to them for the purpose of copying it.

"Q. Yes, but you testified it was copied. We ask the answer be stricken unless we can get a stipulation as to what the facts are.

"The Witness: I know you wanted to copy it, and I presumed you did copy it.

"Mr. Goldstein: There are a lot of things I wanted and didn't get. I ask it be stricken, unless we can stipulate that document is the document referred to as of May 31, 1932, because the record as it now stands, qualifies that letter.

"Judge Wilkerson: The matter is too complicated for me [fol. 7089] to rule on without examining the record. The record will show your motion. You may call it up in argument, hereafter.

"Mr. Thompson: The statement, I believe, is not an accurate statement, but I will check it."

Exhibit A-257 shows on its face that it covers the periods 1916 to 1932, inclusive, and 1923 to 1932, inclusive. The last column is for the entire period, for each of the periods. That is on the first line, for 1916 to 1932, and the second line, 1923 to 1932.

"Q. In connection with your statement as to the option, Mr. Gregory, did you know about a license contract given on May 24, 1927, or an extension of a license contract in which the American Telephone and Telegraph Company participated, to the Automatic, on the day when the money was paid over to the Electrical Research Products?

"A. I am not entirely familiar with that, but I know there is such a license contract in evidence.

"Q. You did not take that into account in any of your calculations in connection with the exhibit X-257, did you?

"A. The basis for the calculation has been testified to, and is also stated in the explanation of the adjustment.

"Q. And is limited solely to the considerations given there, and not to all of the considerations in connection with the option contract?

"A. I think it is clearly stated in the record.

"Q. All right. You spoke of working reserves. Mr. Gregory, when you set up your working reserves, you set up the full amount, do you not, as an operating expense, without taking into account that between the time when you set it up and the time when you use the money, the money might earn an income?

"A. Why, we set it up currently, from month to month."

We set up whatever we think is a proper amount of accrual, and charge that amount against the cost of sales. If we need, say, $100,000 a year from now, we set up one-twelfth, of the full amount that we were estimating at that particular time. The next month it might be a different [fol. 7090] amount. If we estimated that we would need $1,200,000 twelve months from now, we would take one-twelfth of $1,200,000, or $100,000 currently.

Redirect examination.

By Mr. Thompson:

When the Western Electric Company of New York was organized it took over all of the assets of the Western Elec-

tric of Illinois and issued stock in payment for those assets.

Mr. Goldstein has spoken about the purchase by the Western Electric Company from the American Telegraph and Telephone Company of the stock of Teletype Corporation, which had been acquired by the American Telephone and Telegraph Company from the owners of that stock. The American Company issued 150,000 shares of its stock. The market value of that stock at the time of the issue was $215 a share.

We did not carry cash as large as $20,000,000 currently in our business. When I talk about twenty millions of cash being deducted in 1925, that means cash and cash items.

Exhibit A-257, which has been introduced in evidence, about which I was asked on my cross-examination, merely contains a brief statement of the facts in connection with each one of the controverted points set out on this exhibit, and in preparing this I took into consideration not only the facts set out on this exhibit, but all the facts I have previously testified to.

"Mr. Thompson: That it all. We offer in evidence Exhibit A-261, which is the document which was produced by Mr. Gregory while on the witness stand, at the request of Mr. Goldstein.

"Mr. Goldstein: With reference to some of these exhibits, there are the same objections to them that we had to the earlier Gregory exhibits, of which these are merely extensions or modifications, and we would like to follow the same procedure here as we followed with reference to the other exhibits; we will preserve formal objections, and place them with the exhibits, and the other side can state theirs."

(Which said document, so offered and received in evidence, was marked Plaintiff's Exhibit A-261.)

[fol. 7091] WILLIAM H. EGAN, called as a witness on behalf of the plaintiff, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Thompson:

June 30, 1932.

My name is William H. Egan. I reside in New York City. I am senior accountant in the firm of Arthur Young and Company, who are accountants and auditors with offices in New York City, Chicago and other cities. I have been engaged in the accounting business 18 years. Prior to the war I was with other accounting houses and in commercial practice. Subsequent to the war, from 1919 to 1926 with Patterson and Ridgeway, Certified Public Accountants of New York City, and since that time as a senior accountant with Arthur Young and Company.

The firm of Arthur Young and Company has audited the books and records and certified to the published accounts of the Western Electric Company for the five-year period ending December 31, 1931. That firm has also audited the books and records of the following subsidiaries of the Western Electric Company for the period of time indicated: Electrical Research Products Inc., for the period 1927 to 1931, inclusive; Graybar Electric Company, Inc., for the year 1927 to 1928; Bell Telephone Laboratories, Inc., for the four years ending December 31, 1930; Manufacturers Junction Railway, for the five-year period ending December 31, 1931; 395 Hudson Street Corporation, for the five years ended December 31, 1931; Weco Realty Corporation for the years 1930 and 1931; Weco Corporation for the years 1930 and 1931, and Teletype Corporation for 1931.

These audits were made in the regular course of business. All the work of auditing the books and records of the Western Electric Company, and of its subsidiaries to which I have specifically referred, was done under my personal direction and supervision.

[fol. 7092] In my opinion, from the audits which I have made in the regular course of business, the books and records of the Western Electric Company during the five years ended December 31, 1931, and the books of the subsidiaries which I have named during the period for which I audited them, were correctly and accurately kept and the entries made therein in accordance with sound accounting practice.

The firm of Arthur Young and Company was employed for the purpose of examining certain exhibits which had been prepared by Mr. R. H. Gregory, Comptroller of the Western Electric Company, which have been introduced in evidence in this case and for the purpose of checking the figures contained in these exhibits against the records of the Western Electric Company and its subsidiaries and in the case of certain exhibits, against figures contained in Poor's and Moody's Manual, for the purpose of determining whether these exhibits correctly and accurately set forth the figures which they purport to show. I have a list of the exhibits which I examined there.

(Which said list was identified as Plaintiff's Exhibit A-262.)

Exhibits A-75, A-77, A-78, A-79, A-80, A-81, A-84, A-85, A-86, A-87, A-88, A-89, A-90, A-91 and A-83, are the exhibits which I checked and audited as against the records of the Western Electric Company. The firm of Arthur Young and Company was employed to do this work about December, 1930.

"Mr. Adcock: If the Court please, I don't see how this is rebuttal testimony. It does not rebut any questions we have raised.

"Mr. Thompson: Yes, it does.

"Mr. Adcock: How?

"Judge Wilkerson: What is the objection? To the whole line of questioning?

"Mr. Adcock: Yes.

"Judge Wilkerson: Well, I suppose because Mr. Gregory is an employee of the company.

"Mr. Thompson: Beg pardon?

[fol. 7093] "Judge Wilkerson: I say, I don't know on what theory it is offered. I suppose it is offered on the theory that is followed in a large number of instances, that he is employed by an interested party, and this is offered as being made by somebody who is disinterested.

"Mr. Thompson: Of course, and then when they are challenging, we are here to prove the accounts are correct.

"Mr. Goldstein: We have not challenged any accounts.

"Judge Wilkerson: For instance, when we have a receivership here, when a property goes into the hands of a receiver, they have an accounting department, they have a comptroller, but the first thing is to have the books

audited—usually, I would say, the first thing is to have the books audited by some disinterested firm of accountants at the time that the Court takes the property over. Nobody may be assailing the accuracy of it, but it is the act of an interested party.

"Mr. Thompson: His testimony will go somewhat further than that in rebuttal too.

"Judge Wilkerson: But on that theory, it is perfectly proper."

In addition to the time spent on our regular auditing work, from December, 1930, until about the middle of May, 1931, we worked continuously on this job with an average of 10 to 12 men. We again took up the work about the middle of November, 1931, and have worked practically continuously until the present time, with an average of about four men. In checking Mr. Gregory's exhibits, I had access to and used the same books and records which he used in the preparation of his exhibits.

"Q. I hand you now Exhibits A-75, 77, 78, 79, 80, 81, 83, 84, 85, 86, 87, 88, 89, 90 and 91, and ask you to state whether you did in fact supervise the checking of these exhibits against the records of the Western Electric Company and its subsidiaries, and in cases wherever referred to, to Poor's and Moody's Manuals, against these manuals?

"A. I did."

We have audited for the five years ended December 31, 1931, the books and records of the Western Electric Com-[fol. 7094] pany at its head office in New York, at its Hawthorne and Kearny plants, and at its New York and Chicago distributing houses. We have also audited its previously mentioned subsidiaries for the various periods referred to. For the other distributing houses and subsidiaries of the Western Electric Company, we examined records made to the Comptroller of the Western Electric Company, in the regular course of business, which are the same reports testified to by Mr. Gregory. For the years 1916 to 1926, not previously audited by us, we have examined the books and records that were available at its head office in New York, at its Hawthorne and Kearny plants, and at its New York and Chicago distributing houses. For the other distributing houses and subsidiary companies, we have examined reports made to the Comptroller of the Western Electric

Company in the regular course of business, which are the same reports testified to by Mr. Gregory.

These exhibits which I have listed, correctly and accurately reflect the entries on the books of the Western Electric Company and its subsidiaries, where they related to Poor's and Moody's Manuals, or the figures in those manuals which the exhibits purport to show.

I have checked the allocations and apportionments made by Mr. Gregory and used by him in his Exhibits A-77 to A-80, both inclusive, of net profits and average investment as between Bell and non-Bell business. I think they were correct and proper methods and that the use of them will give a substantially accurate result. Sales as shown on these exhibits are actual sales and were verified by us from the records and the books of the company. The company allocates expenses not included in the shop cost of sales, directly to Bell and non-Bell business where possible, but expenses which cannot be directly allocated, are pro-rated on the basis of shop cost of sales. This distribution was reviewed by us. In my opinion, the methods used for making these various allocations and apportionments are correct and in accordance with sound accounting practices.

I have seen Exhibit X-35 which was prepared by Mr. Hagberg and which has been introduced in evidence in this [fol. 7095] case. This exhibit shows for a number of groupings of years, between 1916 and 1931, and for the entire period, that the net shop variations and other adjustments which were made to basic gross profits by the Western Electric Company in order to make apportionments between its Bell and non-Bell business were the result of certain gross adjustments, plus and minus, which were much larger when added together, than the net adjustments. I am familiar with this fact. In connection with the properties of the company's method in this connection I believe that the apportionments are substantially correct and that it would have made no appreciable difference if the gross variations, plus and minus, had been apportioned. This is true, in my opinion, because in the main, these apportionments relate to telephone apparatus and lead-covered cable which are manufactured by the company, both for its Bell and non-Bell customers in the factories and on the same machines and are of the same general type and character.

In my check of Mr. Gregory's exhibits I found two items in which I would make a change and I found other items

which I would treat in years, differently from what they are treated in his exhibits.

First, in 1924, an appropriation was made for pension fund purposes, of $2,000,000 and charged entirely to the Bell business. $120,000 of this should have been assessed to the non-Bell business and I would now make this change if I were recording the facts. This would result in increasing the Bell profits for 1924 by $120,000.

Secondly, patents had been charged, up to four or five years ago, to reserve for contingencies instead of being included in the cost of sales. Such patents, in my opinion, are a proper charge against cost of sales, and this would result in decreasing the Bell profits on the Western Electric if so treated.

Third, in 1928, the Western Electric Company made a reserve for machinery depreciation of $2,000,000 representing the difference between annual depreciation rates of 7½ and 10 per cent. This was entered on the books for 1928. As [fol. 7096] a matter of fact, this reserve was applicable to the years 1924, 1925, 1926 and 1927, and I would so record it now, if I were making new apportionment between Bell and non-Bell business. I would make no difference in the amount to be recorded, but would merely distribute it among different years.

Fourth, for the period 1924 to 1927, the Western Electric Company made an extraordinary reserve for depreciation of $8,233,000. This was to cover a loss in value for the years 1917 to 1927 in its physical plant. I think that this item would not affect the profits, but I would decrease the average investment by reducing the cost value of the plant.

Fifth, with respect to federal taxes, the company bases its yearly results on accruals. There is no other way in which it can do this. If I were re-stating Mr. Gregory's exhibits, I would use the actual payments instead of accruals which would make a difference of about $200,000.

In case changes were made other than the extraordinary reserve for depreciation for the period 1916 to 1931, it would reduce the return on investment on the Bell business one-tenth of 1 per cent. For the period 1923 to 1931, it would increase the return one-tenth of 1 per cent. In regard to the change in regard to handling extraordinary reserve for depreciation, I figured that that would increase the Bell profits in the neighborhood of two-tenths to three-tenths of 1 per cent.

* * * * * * *

[fol. 7097] WILLIAM H. EGAN, recalled as a witness on behalf of the plaintiff, having been previously duly sworn, further testified as follows:

Cross-examination.

By Mr. Goldstein:

July 1, 1932.

The only audit reports which have been issued by my firm in connection with the audits of the Western Electric Company, or the Electrical Research Products Company, are the certificates on the back of the annual reports of the Western Electric Company where Arthur Young's name appears.

When I stated:

"The apportionments are substantially correct between the Bell and non-Bell. It would make no possible appreciable difference if the gross variation plus or minus had been apportioned, because in the main these apportionments relate to telephone apparatus and lead covered cable which were manufactured by the company both for its Bell and non-Bell customers, in the same factory, on the same machine, and are of the same general type and character."

I meant that the same general type that is sold to both the Bell and non-Bell customers is made on the same machine. That is, the same identical item, if sold to both Bell and non-Bell, is made on the same machine. I am not expert enough on the manufacturing to know whether a switchboard lamp and a panel frame are made on the same machine, but I know the general structure of the company is such that the same goods that are sold to the Bell and non-Bell are made on the same type of machine. That is the identical item, for instance a switchboard lamp, is sold to Bell and non-Bell customers. It is only in that aspect that I am referring to it when I say that they are of the same character. I had that in mind at the time of my answer.

[fol. 7098] JAMES CAMPBELL BURTON, called as a witness on behalf of the plaintiff in rebuttal, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Thompson:

July 1, 1932.

My name is James Campbell Burton. I live in New York City. I am a partner of the firm of Arthur Young and Company, Accountants and Auditors. I have been connected with that firm since the year 1921. For a period of eight years prior to that I was out of the accounting business, but prior to that eight years I had eight years before in the accounting business. During the eight years that I was out of the accounting business, I was in a department store.

I am acquainted with the Western Electric Company. The firm of Arthur Young and Company has done work for the Western Electric Company in auditing its records and the records of its subsidiaries, and in checking certain exhibits which have been introduced in evidence in this case. That work has been done under my personal direction and supervision. I know of the work which has been done and I have approved the results obtained. I supervised the work that has been done, have instructed the various accountants on the work, and have approved the findings made by them.

I have heard the testimony of Mr. Egan in this court room yesterday and today, in connection with the work of Arthur Young and Company in the auditing of the Western Electric Company's books and those of its subsidiaries and in auditing and checking certain exhibits of Mr. Gregory. I agree with Mr. Egan's testimony. I have knowledge of the facts as to which he testified.

(No cross-examination.)

. . . . . .

[fol. 7099] Allan B. Crunden, recalled as a witness on behalf of the plaintiff in rebuttal, having been previously duly sworn, further testified as follows:

Direct examination.

By Mr. Blackman:

July 1, 1932.

Referring to Defendants' Exhibit X-111, I am familiar with the manner in which the figure of 59.53 per cent, being

the last figure on that page, is obtained. The percentage figure of 63.39 on page 4 of Exhibit X-108 directly deter- [fol. 7100] mines the 59.53. It is used essentially in the capacity of a divisor. Being used as a divisor, the percentage on the last line of Exhibit X-111 goes up. It goes up as the 63.39 would go down. That is inevitable from the arithmetic of the proceeding. It has nothing to do with these particular examples, but it would be so in any comparable computation.

This 63.39 is obtained by dividing the last figure in the first column of figures on page 4 of Exhibit X-108, being $135,740,062.82 by the first figure in that column, $719,964,600. The first figure on the exhibit is the $719,000,000 plus and the other is the last figure on the exhibit in the first column. The first figure is called capital stock and the last figure is the sum of all of these figures representing capital stock, capital stock premiums, capital stock installments, funded debts, and loans from associate companies.

As a matter of elementary arithmetic, if the capital stock remains the same and any of the other figures that follow it are increased, the percentage attributed to the capital stock decreases. So if the capital stock premiums were increased, the percentage figure that we are dealing with would decrease. If the surplus were increased, that percentage would decrease. The decrease in that figure would increase the result which is obtained on Exhibit X-111 for the per cent return on investment, expressed in per cent of return to American Telephone and Telegraph Company stockholders on their average capital stock investment. The method followed on these pages dealt with, as a matter of mathematics, inevitably results in showing a greater return to the stockholder from the same amount of dividends the more he pays for his stock, provided he pays direct to the company for it. If you deal with all the stock, or with a part of it, along the lines of this exhibit, it would be the same. That is, the mathematics are the same. It is a fundamental principle that brings that about.

Exhibit X-112 takes certain figures representative of the actual results to the American Company of furnishing telephone instruments to the Illinois Bell Company, Chicago [fol. 7101] division, and it includes a showing of per cent return on investment ranging from 6.83 to 6.93 in different years during the period 1923 to 1927; and it builds up these percentages to 25.65 to 30.71 per cent. That is done by two

processes; first, an additional return on investment is introduced in an amount equal to the difference between, first, the estimated cost, per books, to the American Company of providing instruments for the Chicago area, and second, an estimate of what that cost would be if the company were allowed depreciation and 8 per cent return upon current reproduction cost of instruments, less actual depreciation. The second process is that the return on investment is finally converted into a return to stockholders of the American Telephone and Telegraph Company on their proportionate investment in the capital stock. This conversion process is on the same basis as was referred to in the record in connection with Exhibit X-111.

The comparison which I have referred to is, in my opinion, a comparison of things that are not comparable.

Exhibit X-115 relates to telephone instruments used in Chicago, and purports to make a comparison between, first, certain data that the Company presented at the 1929 hearing, referred to in column 1 of this exhibit; and second, certain data that is presented at the present hearing; and third, the actual experience of the Company as presented at the present hearing. The data presented at the former hearing were provided by a witness who testified as to what it might cost the Illinois Company to furnish telephone instruments, if it had no arrangement for instrument service with the American Company. In other words, the data had to do with an arrangement which was not in effect in 1923 and could have been in effect in that year only by hypothesis.

The data referred to in the second column of Exhibit X-115 refer to data presented at the present hearing, purporting to show what would be a fair allowance for instrument service in Chicago for the year 1923 if it were proper to base the allowance as to depreciation and 8 per cent [fol. 7102] return upon the 1923 reproduction cost of the instruments, less the then existing depreciation. The third column of the exhibit has to do with the estimated cost of the Chicago area instrument services for the year 1923. The side heading on line 7, "Actual Return on Investment Obtained", is therefore unsuitable. It has no application to the first two columns and as regards the third column, it has reference to return on book investment.

Consequently, the exhibit should not be read as it might easily be read from mere inspection of the column headings, that the Company presented one showing during the 1929

hearing and another during the 1932 hearing, both of which were at variance with the actual experience as evidenced from the bookkeeping for the third column of the exhibit.

"Mr. Thompson: Your Honor, plaintiff withdraws its objection heretofore made to Exhibits X-220 and X-221, which are trust agreements between the American Telephone and Telegraph Company and the Bankers' Trust Company, trustee—that is Exhibit X-220; and X-221 is a blank form of agreement between the Bankers' Trust Company, trustee, and the various Bell associate companies.

"In that connection, the plaintiff also offers in evidence Exhibit A-269, which is an agreement between the Illinois Bell Telephone Company and the Bankers' Trust Company, trustee, dated December 31, 1927, and it is agreed by the parties that the agreement set out in Exhibit A-269 has been continuously in force since the date of its execution.

"Judge Wilkerson: Very well."

(The document was thereupon received in evidence, marked Plaintiff's Exhibit A-269.)

I have completed my statement with regard to Exhibit X-115, except to call attention to the fact that this exhibit converts the so-called percentage of actual return on investment obtained into a per cent of actual return on the net investment converted to average return to American Telephone and Telegraph Company stockholders. The return [fol. 7103] here referred to was not the actual return and the stockholders did not get any such return, and the method of conversion is, in any event, made on the same basis as was referred to by Mr. Rainwater in connection with Exhibit X-111, the method of which was described by me today. The comparisons that were set up there, in my opinion, were not comparisons of comparable things.

Exhibit X-121 shows data regarding the sale of telephone instruments by the American Company at December 31, 1927, to the licensee companies. It shows in parallel that there was no profit on the sale of instruments to the Long Lines Department but there was a profit on the sale of the instruments to the licensee companies. The Long Lines Department is a part of the American Telephone and Telegraph Company, and that company could not make a profit on a sale to itself. The caption "Sale Price", as applied to the Long Lines, is, therefore, unsuitable, and it is not consistent to so refer to the transaction in question.

Exhibit X-127 purports to show average return to American Telephone and Telegraph Company from dividends on its investments in capital stocks of licensee companies converted into average returns on their investment in the American Telephone and Telegraph Company. This is arrived at in the following manner: the procedure may be illustrated by reference to Illinois Bell Company and the year 1930, where the percentage of 11.24 per cent is shown. It first appears that by dividing average book value per share of Illinois Bell stock in the hands of the American Telephone and Telegraph Company into the 8 per cent dividend, the yield to the American Telephone and Telegraph Company is 7.67. From this is subtracted the average cost of funds to the American Telephone and Telegraph Company in that year of 6.25, leaving a balance of 1.42.

On Exhibit X-108 it appears that the American Telephone and Telegraph Company has outstanding capital stock, premiums, surplus, capital stock installments and payables of various kinds aggregating $2,746,000,000 plus, and that the capital stock alone is $1,585,000,000 plus, or 57.53 per cent. [fol. 7104] Dividing the 1.42 previously mentioned by 57.53 gives a product of 2.46. To this is added the average rate of dividend paid by the American Telephone and Telegraph Company on its capital stock in this year, 8.78, making a total of 11.24, which is expressed as a percentage of 11.24 per cent, purporting to represent the total return to stockholders of the American Telephone and Telegraph Company per $100 of American Telephone and Telegraph Company capital stock invested in Illinois Bell Telephone Company.

Exhibit X-108, from which the American Telephone and Telegraph Company capital stock figures for 1930 above mentioned were taken, also shows that the American Telephone and Telegraph Company had outstanding $200,000,000 plus of capital stock premiums and $366,000,000 plus of surplus.

The manner in which that return of 7.67 is jumped up to 11.24 is due primarily to taking account of these capital stock premiums and surplus on the wrong side of the equation. Had these items been greater in amount, and the remainder of the items, that is, the capital stock and outstanding indebtedness remained constant, the computed return of 11.24 per cent would be still higher. That is one of the factors I have already referred to in connection with

Exhibit X-111. Subtracting the 6.25 from 7.67 purports to leave a profit, but, of course, it is not the ordinary use of the term "profit". That is in no sense a net profit, in the usual sense in which the term is used.

Exhibit X-128 sets down for each associate company a yield to the American Telephone and Telegraph Company on the book value of its capital stock holdings in each of the associate companies of the Bell System. The yield is calculated in terms of the percentage of the amount received during the year in dividends to the American Telephone and Telegraph Company's book value of capital stock. There is subtracted from such yield the percentage cost of funds to the American Telephone and Telegraph Company in the same year, bringing down a balance which is entitled "Per cent of profit to American Telephone and Telegraph Company."

[fol. 7105] The same criticism which I have applied to the word "profit" in the previous exhibit applies to this one.

The exhibit (X-128) bears the general heading "Profit on Investment of Capital Stock of Licensee Companies", and the investment referred to is the book value of holdings of the American Telephone and Telegraph Company. No consideration is given in this exhibit as to whether the existing investment of the American Company in the stock of these companies is worth more or less than the book value at which it is stated on the American Company's books. Neither is any consideration given to any profits of the associate operating companies which were not divided in the years for which computations are shown. There is also no consideration given as to the manner in which the undivided profits of the associate companies might be affected because dividends were not earned in some of these years.

Exhibit X-129 purports to show percentage of profit to American Telephone and Telegraph Company on stock holdings in Illinois Bell in comparison with percentage of profit to American Telephone and Telegraph Company on stock holdings in other licensee companies. The comments made with reference to Exhibit X-128 as to the manner of calculating the profit ratio and the use of the word "profit" also apply to this exhibit.

Exhibit X-132 contains the same inaccuracy in respect to average loans which has been referred to in the record in connection with Exhibit X-151. It also combines what purports to be profits to American Telephone and Telegraph

Company on its stock holdings with losses to American Telephone and Telegraph Company on loans to associate companies to bring down a net profit to the American Telephone and Telegraph Company. This procedure commingles two very different things and does so in varying degrees with respect to the numerous different companies involved. The relation of the American Company to the associate companies evidenced by its capital stock holdings is an investor relationship, and the book value of the stock investment is not the same as the worth of the investment. [fol. 7106] The loans made by the American Company to the associate companies are advances, a class of relatively short-term financing, and the American Company in connection with them sustains a credit relationship to the associate companies. In some cases the associate companies paid no dividends; in some cases they obtained no loans. The ratio of outstanding loans to book value of American Telephone and Telegraph Company stock holdings varies considerably in the different companies and in the same company at different times. It appears to me the exhibit does not use the words "net profit" in the ordinary sense of the term.

Exhibit X-133 purports to show the average return to the American Telephone and Telegraph Company from dividends and interest on its investments in licensee companies. The purported investment to which reference is made in this exhibit is merely the sum of the American Company's book value of stocks of associate companies owned and the outstanding loans which it has made to licensee companies. Also the sums used in the preparation of this exhibit are incorrect, because based on the erroneous figures for loans referred to in the record in connection with Exhibit X-131.

Exhibit X-134 takes the average return to the American Telephone and Telegraph Company from dividends and interest on stocks and loans in associate companies and converts such average return into a so-called average return to stockholders of the American Telephone and Telegraph Company on their investments in capital stock of the American Telephone and Telegraph Company. The average loans used in these computations are incorrect for the reason pointed out in connection with Exhibit X-131, and the method of stepping up the investment to the stockholders is incorrect for the reason pointed out in connection with Ex-

hibit X-127. This exhibit contains three of the matters which I have previously referred to as incorrect.

Exhibit X-135 contains incorrect figures representative of average loans and it also confounds the investment relationship and creditor relationship of the American Tele- [fol. 7107] phone and Telegraph Company with the Illinois Bell. On line 5 of this exhibit items are starred, indicating losses. The fact is that the American Company received substantial returns on its investments referred to on this line and the existence of red figures is due solely to the peculiar manner of computation adopted in the exhibit.

Exhibits X-142 and X-143 cover the same general subject matter, except that on X-142 dollars are shown, whereas X-143 deals with percentages and with dollars per average station.

Using Exhibit X-143 and the Indiana Bell Telephone Company for convenience of illustration, a purported showing is made that because the Indiana Company was yielding a low return during the early years of the period involved in the present Illinois Bell rate case, the amount of the license contract payment from the Illinois Bell to the American Company should be reduced or the license payment of the Indiana Bell should be increased to 18 per cent. The derivation of the 18 per cent is as follows: In Exhibit X-130, under the heading "Indiana Bell Company" and year 1923, the amount required to equal average Illinois Bell Telephone Company return on capital stock is shown as $863,796. In Exhibit X-137, the above amount is added to the outstanding loans of the American Telephone and Telegraph Company to the Indiana Bell Company upon an incorrect average quarterly rating, and the figure is thereby increased to $1,111,829.

On Exhibit X-142, the American Company's license revenue from the Indiana Bell for the year 1923 is shown as $363,065. Dividing $1,111,829 by $363,065, the product is 306.24 per cent, which is stated on Exhibit X-143 to be the amount required to equal average Illinois Bell Telephone Company return on investment expressed as a percentage of the Indiana Bell Telephone Company's license payment. Adding 100 per cent of the Indiana Bell Telephone Company's license payment to this percentage, we obtain 406.24 per cent, and 406.24 per cent of the 4.5 per cent license contract payment in effect in 1923 produces a hypothetical

[fol. 7108] license contract payment requirement of about 18 per cent for the Indiana Bell Company.

Exhibit X-144 contains percentages which are the same as those shown opposite the words "Balance available for additional return to American Telephone and Telegraph Company" as shown on Exhibit X-143 just referred to.

Exhibits X-148, X-149, X-150 and X-151 are related exhibits. Exhibit X-148 confuses a showing of total costs for the American Company with a showing of costs assignable to licensee companies. The comparison in this exhibit is misleading because the line "Balance available for additional return to the American Telephone and Telegraph Company" does not set forth the same elements under the heading of totals as it does under the heading Illinois Bell Company.

These exhibits assume that inasmuch as the American Company's presentation of its total costs under the license contracts includes losses on loans made to the companies for temporary financing, whereas the costs which the company has assigned to the Chicago area include no such costs, it is fair to compare the Chicago area costs, exclusive of such losses, with the remainder of the costs of the American Company under the license contracts inclusive of such losses. This is incorrect for the reason that the losses on loans due to temporary financing were excluded from the showing for the Chicago area, not because there were no such losses, but because the Company claimed no amount under that heading and if a statement were made for any or all of the other license companies on the same basis, no claim would be therein made for such losses. That is, the effect of these exhibits is based on the fact that in Mr. Heiss' exhibits he claimed as apportioned to the Illinois Bell no part of the losses on temporary financing. The first column was the American Telephone and Telegraph Company side of the picture and it showed certain losses. I do not know what these exhibits are designed to do, but I know that they do not make a fair comparison.

Exhibit X-279 computes a percentage by dividing undi- [fol. 7109] vided profits of associate companies by American Telephone and Telegraph Company book investment in stocks of associate companies plus the amount of loans made by American Telephone and Telegraph Company to such companies.

Exhibit X-280 is a companion exhibit to X-279, and takes the percentage derived in X-279 and converts it into an average return to stockholders of the American Telephone and Telegraph Company on their investments in capital stock of American Telephone and Telegraph Company. The investment of such stockholders in American Telephone and Telegraph Company stock is assumed in this exhibit to be the par value of stock regardless of capital stock premiums or surplus.

Exhibit X-285 purports to be a comparison between dividend payments of the Illinois Bell to the American Company with dividend payments of other companies to the American Company. It is just a comparison of dividend payments without regard to the earnings of the companies. It has nothing to do with earnings, as I read it. The figures that are shown on Exhibit X-131, of which we have had some discussion concerning the seven million and the twelve million, are used to develop the figures on Exhibit X-136, so any error in Exhibit X-131 is carried into X-136 by the identity of the method with respect to the matter that we have been talking about.

Cross-examination.

By Mr. Goldstein:

I understand that Mr. Heiss stated that you could not tag the dollar. All of the funds of the A. T. & T. go into one pot and in any calculation involving the average cost of funds of the American Company you draw the same proportion of bonds, stock, premiums, and bonded debt funds for specific investment the same as the whole.

It uses that hypothesis. I do not see any connection between that hypothesis and Mr. Rainwater's exhibits. I did not find that he changed that hypothesis. He has used the same average cost of funds that Mr. Heiss has used and [fol. 7110] the same ratio of bonded debt, premiums, and capital stock that Mr. Heiss used, applied to the total funds.

If you had $1,000, $500 of which came from credit obligations, $250 came from surplus and premiums, and $250 from capital stock, you would have your total fund of $1,000 composed one-half of bonded debt, one-quarter of premiums and surplus, and one-quarter of capital stock.

"Q. Now, suppose out of that $1,000 you took $500, and you put it into an investment in telephone instruments, and

you wanted to figure what your return was on that $500, and then you wanted to divide up that return, or the return on the $500, to the return on the portion which came from capital stock. Your $500 then would be, one-half came from bonded debt, one-quarter would come from premiums and surplus, and one-quarter would come from capital stock; and so you take your earnings on the $500, and you would deduct that portion applicable for interest on the bonded debt, and you would have the balance available for the stock, would you not?

"A. Well, answering the last part of the question, whatever earnings you would have, out of them you would provide for bond interest, and the balance would be available for return on stock.

"Q. And in figuring $500 was stock, you would take one-quarter of the $500 as being applicable to stock, would you not, because your total had a quarter of stock, one-quarter of premiums, and one-half bonded debt?

"A. Observing the definition of stock as given in the question that is correct."

If you have $1,000, and $500 came from bonded debt, $250 from surplus, and $250 from common stock, the ratio would be one-half, one-quarter and one-quarter. If you varied that $1,000 so that its composition was $1,000 composed of $500 bonded debt, $300 of surplus and premiums, and the balance in common stock, the ratio of each of them would be different to the total. Whatever the ratio is of your total funds, if you maintain the ratio, when you take a portion of the total fund and invest it in a specific investment, you [fol. 7111] always have a proper basis of comparison between your return on the whole and your return on the part, and even though your theory about the whole may be wrong you get a consistent comparison.

"Q. If the American Telephone and Telegraph Company set up a standard to show the effect of its total operations, that is, that after payment of expenses it could build ten office buildings during the year on the profits of its total operations, and you wanted to show the effect from part of its operations, if you adopted that standard of comparison, whether the part of its funds would produce a profit which would enable it to build more than the ten office buildings, you would have a proper basis of compari-

son between its total operations, and the part, would you not?

"A. That is equivalent to saying that if you make this assumption with regard to the ten office buildings to the total, it is then fair to assume the same thing regarding one office building."

The fact that the basis of ten office buildings might not be the proper standard of comparison for prosperity as a general proposition, would not affect the comparison between the whole and the part; I would hope for equal prosperity on one building.

"Q. Now, did Mr. Rainwater do any different when he used the return to the American Telephone and Telegraph Company on its total operations, and he took the figure of return for the telephone instruments from part of its funds, using the same basis of ratio as Mr. Heiss did?

"A. No, I understand that both of these gentlemen assumed that you cannot tag the dollar."

I have a quarrel with Mr. Rainwater as to whether he has made a correct computation, to get from 39 per cent to 59 per cent on the assumption that every dollar of the funds invested in telephone instruments put in by the American Telephone and Telegraph Company, had the same source, in the same ratio as Mr. Heiss used in Exhibit A-164.

"Q. Well, now, Mr. Crunden, will you please, to save time this morning—I have put down on paper the compu- [fol. 7112] tation which you stated to Mr. Blackman, showing—appearing in Exhibit X-127—also the method used in Exhibit X-111; and I have also put down the method by which you would arrive at the $10.44 for the year 1930, in the annual reports of earnings of the American Telephone and Telegraph Company. I have also listed the source of all of the figures. For our purposes will you please assume that these figures are taken correctly from the source stated. I am now interested in determining whether the same identical mathematical computation would be used to arrive from 7.21 for the total return of the American Telephone and Telegraph Company from all of its operations on its entire investment, to 10.44 on its stock, on its average stock outstanding, as shown in its annual reports; and comparing that method with the

mathematical computations used in Exhibits X-127 and X-111; and when I have finished the questioning, I will defer cross-examination, and Mr. Rainwater will help you, and it will only take about five minutes to check the mathematics, to see whether the mathematics are the same in each of the three cases. So will you just please hold that—and that is Exhibit 438—X-438."

Exhibit X-112 is not on a comparable basis because it refers in part to actual results in respect of instruments, and then introduces calculations regarding what might be the condition if the company were getting depreciation and 8 per cent return on reproduction cost. As to whether I am complaining about the mathematics or the purpose of the exhibit: I suppose when you come down to it, I am primarily noting the language of the side headings because it says "Per cent of total return on investment" and there isn't any such thing. I am not criticizing the mathematics. In Exhibit X-128 and the other exhibits where I talked about "profits" it is perfectly clear as to what was meant by the term "Net Profit." In reading the exhibit, you would know from reading it that it meant transferred to surplus. There was no attempt to sneak up on the company or on the Court, on that point. My criticism about it is that it is not the net profit because you haven't any profit. [fol. 7113] I am not objecting to the definition stated there. Its just like persimmons; if you like that sort of "net profit" that is all right, take it, and God bless you.

You will have to ask Mr. Heiss whether, when, in his license contract exhibits he put in the cost of holding funds, those funds that he claimed were being held, were being held for both loans and stock. I am generally familiar with Mr. Heiss' exhibits in this case. My understanding is that the item "Cost of holding funds" as used in all of the Heiss exhibits had reference to the loans and not to the stock.

I am familiar with the item "Cost of holding funds" set up by Mr. Heiss. You will have to ask Mr. Heiss whether those funds being held by the American Telephone and Telegraph Company were to make advances, or were to make advances plus buy stock. I do not know then the purpose for which those funds were being held. Without that knowledge I can criticise Exhibit X-129 because X-129 is wrong.

If the item "Cost of holding funds" developed to be the cost of holding funds for stock purposes as well as making loans, that item of cost would not be wrong for the same reason that I have said that Exhibit X-129 would be wrong. We are talking about different things.

"Mr. Goldstein: If those funds were being held by the American Telephone and Telegraph Company, and there was a direct subscription without any loan advances, would the cost of holding those funds be a proper charge in the license contract?

"A. From the time that they decided that the company would finance through stock, until the time the money was paid for the stock, it would not have anything to do with the license contract. It would be an investor relationship.

"Q. And if the Illinois Bell in November of one year, not having any loans at all from the American Telephone and Telegraph Company, should notify the American Telephone and Telegraph Company that in the year 1924 for [fol. 7114] instance the American Telephone and Telegraph —the Illinois Bell would issue some stock to the American Telephone and Telegraph Company, and the American Telephone and Telegraph Company were holding funds from January 1 of that year until the date of the subscription, you would say that the losses on holding those funds were not a part of the license contract cost?

"A. I would not be able to express an opinion on that without going thoroughly into Mr. Heiss' exhibits."

I would have to see the exhibits, and know the circumstances before I gave my opinion as to whether it would be a proper charge.

"Q. I am just putting this transaction to you, that in November, 1923, the Illinois Bell Telephone Company, in its provisional estimate notified the American Telephone and Telegraph Company that in the year 1924 it would not borrow any money, but it would issue $20,000,000 of stock, and in November—in October or November, 1924, it did issue that stock and the American Telephone and Telegraph Company purchased that stock.

"Now, the American Telephone and Telegraph Company held the funds from January to October, the date of subscription. Would the losses on those funds be a proper charge under the license contract?"

If the American Company in order to have that money available ten months later for the convenience of the Illinois Bell Company, were required to carry it for that time, I should say it would be. Or if there was not a firm arrangement, and it was possible for the Illinois Bell Company to change its mind and say, "We have decided we will not issue that stock; we would rather take some more advances," then, I can see that there is a connection. Even though there were no advances and even though they told them that they would take no advances during the year, they can change their minds on five minutes notice. There is no certainty that because some president ten months in advance says he thinks he will issue stock, therefore, he is going to absolutely issue the stock.

[fol. 7115] I can conceive that there might be circumstances under which even holding funds to buy stock to enter into an investor relationship, is a proper charge. But I would like to study the circumstances, because there might or might not be stock purchased.

In connection with Exhibit X-134; the American Telephone and Telegraph Company has in its possession all of the figures of actual interest paid by the licensees. It has no figures of average loans, because we do not need that in our business. Anyone by having the amount of interest, could obtain the average loans on a true daily basis by dividing by 5.88. The American Company, of course, knew what the interest was and that could have been obtained, if defendants wished it, from the books of the American Company.

Exhibit X-143 is not carried into all of the other exhibits. Of course, it does not carry into all of the other exhibits.

In connection with Exhibit X-148: Under the license contract all of the licensee companies do not get the right to make loans from the American Telephone and Telegraph Company. It does not set that up in the license contract. It says that the American Company will give them such aid and assistance as is within its power, in financing, or words to that effect. Actually, making these advances has been the form that much of the assistance has taken.

The American Telephone and Telegraph Company, in performing that function, has had certain losses, which Mr. Heiss shows under license contract costs for the company as a whole. The Illinois Bell, in some years, got advances from the American Telephone and Telegraph Company.

"Q. Now, you say because Mr. Heiss in his exhibits in this case did not include as a charge against the payment of the Illinois Bell, these losses on loans actually made to the Illinois Bell, therefore the defendants have no right to make a comparison of the fairness of the license contract by showing that the other companies have a substantial—get a substantial benefit, and the American Telephone [fol. 7116] and Telegraph Company incurs a substantial loss, in making these loans, is that it?

"A. I have made no statement tending to circumscribe the rights of the defendants."

I did not say I was criticizing the exhibit on that basis. I said that with respect to the Illinois Bell there was nothing included for losses on loans. That all of the losses on loans were thrown down into the total, so that you are comparing two things that are not the same. Mr. Heiss, in the first column of his exhibit had a statement, of course, from the standpoint of the American Company. In the second column he had certain costs which various witnesses had assigned to the Chicago area. In the second statement there was nothing for losses on loans. Now, this statement compares those two columns blandly, as if they were comparable, and you have got to study the exhibit to find out if that is the case. I am simply drawing attention to it.

My criticism is not because Mr. Heiss did not include in his exhibit any losses on loans, and that defendants included it as to the rest, but my criticism is that this exhibit compares two things that are not the same.

Now, the two columns of Mr. Heiss' exhibit are not the same, as everybody can see by looking at it. Now, here is a lot of exhibits which are as much alike as Chinamen, and I am simply taking one of these complicated exhibits, and finding out a certain fact, which I take it you and I both are in agreement on, that in this section relating to the Illinois Bell, there is no item for losses on loans, financing, but in the total there is an item and that item is the total of all those losses.

Redirect examination.

By Mr. Blackman:

With regard to that example which was given to me by Mr. Goldstein, of the $1,000, of which $250 was represented

by stock, $250 by stock premiums, and $500 by loans or mortgage investments: If the corporation had $10 available for return on the stock, and had $250 stock outstand-
[fol. 7117] ing, you would divide the $250 into $10, and that would give you 4 per cent. That would be 4 per cent on the stock. The return to the investor on his investment in the stock would be one-half that. The way Mr. Rainwater has figured it, it would go just the other way, and be twice that.

W. F. Sloan, a witness on behalf of the plaintiff, resumed the stand, and testified further, in rebuttal, as follows:

Cross-examination.

By Mr. Goldstein:

July 1, 1932.

In making up Exhibit A-243, I used the data that Mr. Cummings had put into the record. I used some other data on pole lines, of course; I found from the vouchers the number of tank-treated poles, I used that data. For cable footage, I took Mr. Cummings'. For the prices that were used as of June 30th I took Western Electric prices. I don't know how much time it took us to make up the study. We were doing so much work, after we got Mr. Cummings' exhibits; I suppose we have had them two months, or more. I have been working continuously on this and other exhibits, but not with all of our force. We had three or four men, and then we made use of some of the Company's employees in addition. The number of Company employees varied. I don't know. Some days we would have two or three and sometimes four or five. I could look up that data. Well, I would say we had, most of the time we had about three of our own people, besides Mr. Cook and myself and two or three of the Company's people, three or four.

Exhibit A-249 is practically the same as the other, except that it has the additional correction for the productive hourly rate, so the same general data was used, and there we did make use of some additional data that was not contained in Mr. Cummings' exhibits. The productive hourly rate for the last six months of 1923 we had to get from the
[fol. 7118] same source that Mr. Cummings got the data for the first six months. That is practically the only difference.

Much the same general type of answer would apply to

Exhibit A-251 as to the other concerning sources. That also includes specific estimate performance. I used the same general sources as I used before.

Exhibit A-251 was finished day before yesterday. Exhibits A-249 and A-243 were finished some days prior to that.

On the second to last page of the copy of Exhibit A-252, delivered to defendants, the last sentence, "J. G. Wray also lists the same estimate twice in two different instances on this page", appears. That should have been stricken out. The tabulations on those two pages where these words have been stricken out are based on the supposition that the duplications existed. That would not be affected very greatly, however, because one of those estimates only involved $300, and I have forgotten how much was involved in the other, but it would not change the general result of that very much. Perhaps it would change it slightly.

In my testimony I stated: I have ascertained whether the poles included in this two and a half year period of Mr. Cummings' exhibit, were in part tank-treated poles. I obtained this information from the Western Electric Company invoices. All of those vouchers pertain to Chicago area only. They don't show which were placed in the Toll Pole Line Account, and which in the Exchange Pole Line Account, but the facts are there were not many poles in the Chicago area. They do not show what poles were placed at all, but they were bought for Chicago, and evidently used in Chicago. I assumed they were used in the Chicago area. There might be a variation of three or four or a dozen poles that did not go in, but if you take the two and a half year period for the purchases, it is perfectly obvious those poles were used in Chicago.

The A. N. A. cable replaced the earlier N. A. and T. A. cable about June 1, 1923; that is when it first appeared in the catalogue. The difference between the A. N. A. and the [fol. 7119] N. A. and the T. A. cable was a detail of manufacturing. In general, they serve about the same purpose.

In Exhibit X-6 Mr. Cummings did not use the productive hourly rate as of June 30, 1923. That is the point of our objection. He used it for the first six months of 1923. He used the average for the first six months of 1923. He may have thought he was using the hourly rate for the six months ending June 30, 1923, to develop the hourly rate level as of June 30, 1923, but he didn't. He took the average productive hourly rate for the first six months. He used the

hourly rate for the first six months of 1923 to convert all of the gross expenditures for the years 1921, 1922 and the first six months of 1923 to that extremely low level. Not to the level as of June 30, 1923; that is the point, he didn't. He used it for the first six months of 1923, which is entirely different from the June 30th level. That is the point of our objection.

He said he was developing a June 30th level, but he corrected it by—well, I will tell you how much he corrected it. He corrected it from 90.78 to 90.79 in the Pole Line Account, 1/100 of 1 per cent.

Approximately one-third of the total labor cost of setting the pole is digging the hole.

I criticized Mr. Cummings' application of trial units for main cable only to a composite group of cable consisting of main and subsidiary, and I stated as follows:

"So he applied his correction factor against all of the sizes indiscriminately, and it is, of course, perfectly obvious that the correction factor should have been applied against the size that belonged to the subsidiary group."

You would have to approximate these sizes from the records of the Illinois Bell showing which were main and which were subsidiary cable. But the way Mr. Cummings used it was entirely improper. You can approximate it very closely.

[fol. 7120] Redirect examination.

By Mr. Thompson:

In the preparation of the exhibits which were introduced during my rebuttal testimony I used nothing whatever except the records of the Illinois Bell Telephone Company and Mr. Cummings' work sheets.

Reference has been made to certain types of cable which first began to be used in 1923. In Exhibits A-2 to A-10, both inclusive, I reproduced the actual types of cable that were in the plant from year to year.

. . . . . .

[fol. 7121] Allan B. Crunden, a witness on behalf of the plaintiff, having been previously duly sworn, resumed the stand and testified further in rebuttal as follows:

Cross-examination (continued).

By Mr. Goldstein:

I have not checked all of the calculations on Exhibit X-438 because they are numerous, but I have checked enough of them to understand the exhibit for the purposes of the comparison.

"Q. Are the mathematical calculations on pages 1 and 3 the same, to arrive at the result in page 1, from 7.21 to 10.44 for the entire Company investment, year 1930, to arrive from 7.67 to 11.24 in the last column on page 1, and to arrive from 32.15 to 59.52 on page 3, in the case of telephone instruments for the year 1923.

"A. As mere mathematical computation.

"Q. Yes.

"A. Regardless of captions, or anything else.

"Q. That's right.

"A. Just the comptometer operation, that is correct.

"Mr. Goldstein: Yes. I would like to make one correction, a typographical error. The item D on page 2, which reads "Capital stock investments" should read "Capital stock installments".

"A. Yes. I have not checked all these details on page 2. I will change this word to "installments".

(Defendants offered in evidence Exhibits X-436, X-437 and X-438. Received.)

Redirect examination.

By Mr. Blackman:

The terminology on X-438 is not the same as that used on X-111. On sheet 3 of X-438, the last item reads, "Per Cent return expressed on capital stock par value 59.52". That is a correct development of the amount which he purports to develop under the assumptions contained in the previous lines of the exhibit. In connection with the same figure, [fol. 7122] 59.53, on Exhibit X-111 the wording is "Per cent of return on investment expressed in per cent of return to A. T. & T. stockholders on the average capital stock investment". Those are by no means the same things at all.

Recross-examination.

By Mr. Goldstein:

If he had put in per cent of investment expressed in return on capital stock par value it would have made page 1

wrong in the same way that page 3 is wrong. Then the 10.44 would have been wrong as applied to the heading that you proposed to be used.

"Q. And when the American Telephone and Telegraph Company told its stockholders that the earnings were 10.44 on capital stock, do you consider that that was an expression of return on investment expressed on capital stock par value or not?

"A. No, I don't think the word "investment" comes in there at all in that connection.

"Q. You did not consider that the 10.44 was a return on investment?

"A. No."

Redirect examination.

By Mr. Blackman:

The word "investment" is a generic term. The 10.44 represents the relationship between the earnings of the company and the par value of the stock or shows the earnings per share. It takes no account of the fact that much stock was issued at a premium. Some of the stock was issued at 180. It takes no account of the fact that there is surplus invested in the business to provide part of the earning power which is reflected in this 10.44.

Recross-examination.

By Mr. Goldstein:

"Q. And by that you mean that 10.44 would cover not only the return for the money put in to form the capital stock, but also surplus and premiums.

[fol. 7123] "A. The 10.44 is the per cent return figured on the par value of the capital stock.

"Q. But that is the total return that the stockholder would get on his entire investment, capital stock, premiums and surplus.

"A. Well, you are talking about it as if you could transmogrify a percentage from one base to another, and you cannot do that. If you say there is 10.44 per hundred dollars of par value of capital stock, and that is all that the business gets, that is all right. But we have got a percentage that we are dealing with here. That percentage represents the amount of earnings available for the stockholders for whatever investment they had, including the

stock premiums and surplus, as related to the par value of the stock.

By the way, that exhibit is headed up "A. T. and T. Company", and then it goes on to say, "Use of a conversion factor", and so forth. I think it ought to be made clear that the American Telephone and Telegraph Company never used that conversion factor.

Redirect examination.

By Mr. Blackman:

The American Telephone and Telegraph Company does not use any such formula as appears on the sheet 1 of X-438. It is not necessary. All it does it to say, "Our net income is so much, we have so many shares of capital stock, and that amounts to so much a share". That is 10.44. And that is shown on that exhibit.

A great deal of that stock was paid for at $180 a share. The investment of the man who bought that stock was not $100, but $180. What is done in X-111 is to proceed as if the investor had paid only $100 for his stock.

"Mr. Bracelen: Counsel states that that completes his cross-examination of plaintiff's witnesses on rebuttal. One of my associates suggests that I should broaden the offer I made a moment ago to cover all exhibits that have been iden-
[fols. 7124-7274] fied by the plaintiff's witnesses on rebuttal, so that the record will leave that point in no doubt.

"Judge Wilkerson: They are admitted subject to the objections.

"Mr. Goldstein: I want to offer the X exhibits, if the record appears we have made no formal offer, we offer all of the X exhibits, so there will be no question about it.

"Judge Wilkerson: They are admitted."

[fol. 7275] June 4, 1932.

JOHN S. HAGBERG, on behalf of defendants, testified as follows:

Direct examination.

By Mr. Goldstein:

My name is John S. Hagberg. I reside at Highland Park, Illinois. I am employed as a senior accountant by Touche, Niven & Company, public accountants, who have

been established in business for more than thirty years, and who have offices in Chicago, New York and the principal cities in the United States; in Paris, France, and, by association with George A. Touche & Company, London; offices in the principal cities in Canada, British Isles and South America. I have been associated with that company close to fifteen years. Before that, I was employed by different commercial concerns. I went to school in Sweden and then was employed in Germany and came to this coun- [fol. 7276] try about 1902. I am a member of the American Institute of Accountants.

My duties in connection with my employment with Touche, Niven & Company have been auditing and examination of accounts and cost accounting methods of principally larger manufacturing concerns. I have been engaged in installing and revising cost accounting systems of several manufacturing concerns.

I was employed by the City of Chicago on or about January 1, 1932, in connection with the present case. My employment was particularly in connection with the plaintiff's showing of the Western Electric profits and the costs allocated to the Bell and non-Bell business. I was present in the courtroom most of the time when Mr. Gregory testified in this case and I was present when he testified on the matter of Western Electric costs and profits shown in Plaintiff's Exhibits A-77 and A-79. I was present when those exhibits were offered. I have read his testimony.

In connection with my examination of the data underlying these exhibits, I examined the binders referred to by him in his testimony, and the records, and made investigations at Hawthorne and in the New York headquarters of the Western Electric.

Exhibit X-15 entitled "Western Electric Company Profit and Loss, year 1929," was prepared by me and under my supervision with the assistance of the employees of the Western Electric. They are practically all the Company's figures so far as the first two lines are concerned, including the total sales. That is, I was in agreement with the Company on those figures. Under the line "Gross profit" the figures "Basic gross profit adjusted" are also the Company figures shown in the binders or obtained through the assistance of the Western Electric employes. That answer also stands for the allocation between the Bell and the non-Bell and between the telephone apparatus, lead-covered

cable and supplies. Concerning the two lines shown under "gross profit" as "Manufacturing surplus and current underrun" it is necessary to bear in mind that the Western Electric Company, by reason of using standard costs as defined by Mr. Gregory, is required to make adjustments thereto, in order to arrive at the gross profit figure, and these adjustments depend upon standard shop cost of sales as a basis of allocation between Bell and non-Bell busi-
[fol. 7277] ness, and depend upon sales as the basis of allocations between Illinois Bell and the Bell System, as between the Chicago Division and the Illinois Bell as a whole, on Mr. Gregory's basis of allocation in arriving at the net profit in Exhibits A-77 and 79 and A-93 to A-98.

The first line, "Manufacturing surplus and current underrun" shows $17,720,000 in the black. This means that a group of adjustments resulted in additions to the basic gross profits and resulted because the actual expense in regard to labor cost, material cost and overhead combined on the manufactured articles to which they applied was less than the standard or estimated cost for the aggregate of these three cost factors included in the standard costs for the year for such manufactured article.

The second line, "Manufacturing surplus and current underrun, $15,247,000," in the red means that another group of adjustments resulted in deductions from the basic gross profit and resulted because the actual expense in regard to labor cost, material cost and overhead combined on the manufactured articles to which they applied, was more than the standard or estimated cost for the aggregate of these three cost factors included in the standard costs for the year for such manufactured articles.

The next two lines, "Inventory revaluation and reserves," show on one line in the black $122,000, and in red, $6,747,000. That means that to the standard inventory valuations which the Western Electric uses as the first step in valuing the inventory at the beginning and end of each year, the Western Electric Company made a group of additions and a group of deductions to arrive at the inventory value of cost and market, whichever is lower.

The detail showing manufacturing surplus and current underrun and the inventory revaluation and reserves will appear in statements which will be offered by me as Defendants' Exhibits X-16, X-17 and X-18.

The figures under "Total" from the four lines following "Basic gross profit," represent an aggregate of the adjustments and were taken from the binders, and in agreement with the Company's employees. So, also, the figures shown in the columns under "Total" for the telephone apparatus, lead-covered cable and supplies were taken from the binders, and were in agreement with the employees of the com-
[fol. 7278] pany. The binders did not show, in each case, where the allocations of adjustments were made to Bell and non-Bell. They did not show in each case the gross additions that were allocable to Bell and non-Bell, and the gross deductions that were allocable to Bell and non-Bell. In many cases the allocation was made of the net result of the certain additions and certain deductions.

To arrive at the gross additions allocable to Bell and non-Bell and the gross deductions allocable to Bell and non-Bell in those cases, I was compelled to make my own allocation.

The figures in the line, "Total gross profit" and the allocation to telephone apparatus, lead-covered cable and supplies, and the division of each class between Bell and non-Bell, are in agreement with the Company's own figures, as furnished to me. All the other figures on that statement both for total figures and the distribution between the classes of product and between Bell and non-Bell, are all taken from the Company's binders, that were furnished by the Company.

The Company's records and the binders as I found them, treat telephone appliances and special products as one class of products, known as telephone apparatus. That is, they treat them as one class in considering the costs and adjustments in their allocation between the classes of products, and not as to sales. In their records, under the main heading of "Telephone apparatus" are included telephone appliances and special commerical products.

Exhibit X-15 shows, that for telephone apparatus alone the total adjustments that were spread over all items of that class were $30,798,000, covering the manufacturing surplus and current underrun, and being the totals of the additions and the deductions. It foots to that amount.

The cost of sales of telephone apparatus in 1929, as shown on Exhibit X-15, by deductions, was $164,350,000. The gross adjustments represented 18.7 per cent of such total cost of sales. The sum total of the adjustments applicable to tele-

phone apparatus and allocable to Bell customers, to be spread among the customers in the Bell System, was $28,414,000, in the year 1929. That represents 19.84 per cent of the cost of sales of telephone apparatus to all Bell customers.

The binders did not show, and the Company employees advised us that it had not been made, and that they had no [fol. 7279] data available from which we or they could determine the adjustments applicable to the separate hundred thousand or more items making up the class "telephone apparatus."

The same answer was made to me with respect to the determination of the adjustments which were applicable to the items which were sold to the individual Bell customers, including the Illinois Bell or the Chicago Division of the Illinois Bell.

With reference to records available to determine the sales of the separate items of telephone apparatus between Bell customers, they advised us that there was no such record of individual items. We went to the Chicago distributing house of the Western Electric Company in order to check the sales figures for the Illinois Bell, and we found that the records showed only the gross billing, and not by individual items.

Exhibit X-15-A, entitled "Summary of Sales," and Exhibit X-15-B, entitled "M-201, Sales and Gross Revenue," were given me during my investigation at the Chicago distributing house to show the sales were broken down, and what classes. That is on form X-15-A. On the form marked X-15-B, these findings are just summarized, but individual items of manufacture are not segregated on these forms, nor are the sub-classes making up these main classes divided up.

We only have the main headings of apparatus and equipment, lead-covered cable, supplies materials, transportation, service, and what is called general sales. They are somewhat broken down, but not as to items or sub-classes of items.

What I said with reference to the manufacturing surplus and current underrun was equally applicable to the figures for inventory revaluation and reserves, and their distribution between the Bell and the non-Bell customers and between the various Bell customers in the Chicago division and the Illinois Bell.

Exhibit X-15, shows the gross adjustments of thirty millions. The exhibit also shows that for manufacturing surplus and current underrun for telephone apparatus, the net adjustments, were only $2,736,000 additions to profit, or 1.66 per cent of costs of sales of telephone apparatus. That is the difference between the two lines, the black figures and the red figures. And this exhibit also shows that there were $946,000 net adjustments by way of additions to profits from [fol. 7280] Bell apparatus, or 66/100ths per cent of the cost of sales of telephone apparatus to Bell customers. The net adjustments which depended on the standard shop costs as a basis of allocation, if they represented the total adjustments, would have a negligible effect on the profits on sales to any or all customers, but it would be as erroneous to consider the net figures in this instance as it would be to say that because the control account of a ledger of account receivable was out of balance with the detailed accounts by one cent, the errors resulting therein would not be harmful even though the one cent error was the net result of overstatements and understatements in each customers' account aggregating for some customers thousands of dollars one way or for other customers thousands of dollars the other way. I found that the adjustments were apportioned between Bell and non-Bell business, partially by direct allocations and partially on the basis of standard cost of sales. I found, in cooperation with the Western Electric employees, that the adjustments applicable to special commercial products were allocated, in part, by direct allocation and in part by standard costs of sales.

The allocation of special commercial products was on the basis of studies, but a large percentage of adjustments were allocated on the basis of standard cost of sales.

Exhibit X-16 is entitled "Analysis of Basic Gross Profit, Year 1929." That is merely detail making up the basic gross profits, and was compiled from the binders, with the assistance of the Company, and is self-explanatory, and gives in complete form the figures which Mr. Gregory testified to. In Mr. Gregory's testimony, some of the items were not mentioned. What I have done is to complete them, and get in agreement with the Company on it.

Exhibit X-17 is entitled, "Manufacturing Department—Surplus and Current Underrun, Year 1929." That also represents the detail making up the additions and deductions

from the gross profit for the manufacturing departments surplus and current underrun, and was made from the binders, with the assistance of the Company, and was prepared, as I have previously explained. In X-17 I show in the margin "D-80." That indicates, in each case, the particular adjustments which Mr. Gregory included in compiling the exhibits which we have identified as D-80, and to [fol. 7281] which he made reference as bearing upon the .2 of 1 per cent calculation. We earmarked those items by putting "D-80" in front of them, in the margin.

Exhibit X-17 shows that there are adjustments in the several factories, in the distributing houses, and in the merchandising department, and that the adjustments which in one department of the business and at one location result in additions to gross profit, in another location and department of the business result in deductions from the gross profit. It also shows that the adjustments which add or subtract from the gross profit for telephone apparatus and lead-covered cable are different in the same department of the business and in one location from other locations and departments of the business. Take, for instance, at Hawthorne, the telephone apparatus showed an addition adjustment for shop surplus in production of $4,575,000 and the lead-covered cable showed an addition of $804,000, but at Kearney it showed a deduction of $6,636,000 for telephone apparatus but an addition of $458,000 for lead-covered cable.

Exhibit X-18 is entitled "Inventory Revaluation and Reserves, year 1929." That represents the detail of the items, inventory and revaluation reserves, shown in X-15, and these items were explained by Mr. Gregory; but X-18 is the complete statement compiled from the binders, and with the assistance of the Company, whereas, Mr. Gregory just testified to certain of the items.

This again shows the variations in amount and character of adjustment at the different locations and different departments.

Exhibits X-19 to X-25, inclusive, represent, for the years 1924 to 1931, profit and loss statements corresponding to profit and loss statement X-15 for the year 1929. The details for each of these exhibits for the years 1924 to 1931, other than 1929, corresponding to Defendants' Exhibits X-16, X-17 and X-18 for the year 1929, were prepared, and a type-

written copy for each of the details, for each of the years 1924 to 1931, inclusive, were furnished to the plaintiff's attorneys.

Exhibits X-19 to X-25, X-19 being the profit and loss statement in the year 1924, X-20 being the profit and loss statement for 1925, X-21 being the profit and loss statement for 1926, X-22 the profit and loss statement for 1927, X-23 the [fol. 7282] profit and loss statement for 1928, X-24 the profit and loss statement for 1930, and X-25, profit and loss statement for 1931, were all prepared in the same manner, and with the same assistance of the Company's employees as described in connection with Defendants' Exhibit X-15.

Exhibit X-26, entitled "Profit and loss statement for 1916," X-27, profit and loss statement for 1917; X-28, profit and loss statement for 1918; X-29, profit and loss statement for 1919; X-30, profit and loss statement for 1920; X-31, profit and loss statement for 1921; X-32, profit and loss statement of 1922; X-33, profit and loss statement for 1923, —were prepared from the binders and with the assistance of the Company and under my supervision.

In my examination of the binders, I did not find any distribution or any data from which a distribution could be made of the gross adjustments between Bell and non-Bell business for the period 1916 to 1923. The only distribution we could find was the distribution of the net adjustments as between Bell and non-Bell, that is, the net figures, which are the net figures of gross profit, they are divided between Bell and non-Bell, but the details making up the basic gross profit and adjustment, were not available. I have requested the Company to give me the data from which could be determined the allocation or adjustment between Bell and non-Bell. That request has been with the Company for quite a while. I will add to that, that we were told that there was no data available in that respect, except that we could perhaps, if they were still in existence, obtain them at the locations at the Hawthorne plant and also the distributing houses.

Wherever they were applicable to, and where the Company was doing business or operating at that time, the data on which a split could be made might be available, but they were not sure whether it was or not, or whether it was even in existence.

I did not make any allocation for these years in Exhibits X-26 to X-33 between the non-Bell and Bell business. Defendants' Exhibit X-34 is entitled "Gross Profit." That consolidates, on two sheets, the additions to Gross Profit [fol. 7283] and the deductions from Gross Profit, total adjustments to Gross Profit, and not adjustments to Gross Profit; and all of the figures on X-34 are taken from Exhibits X-15 and X-19 to X-33, both inclusive.

Exhibit X-34, entitled "Summary Sheets Showing Gross Profits and Adjustments by Years 1916-1931; both inclusive," is intended to show in summary form the additions, deductions and total adjustments, and the result on the net. Exhibit X-35, entitled "Gross Profit and Analysis Summarized 1916-1931," groups the additions and deductions to Gross Profit, the total adjustments, and the net adjustments shown in X-34 according to the period of years. X-35 shows the extent to which adjustments for telephone apparatus separately, also lead-covered cable and supplies separately, each increased the profit and decreased the profit, how they offset each other over a period of years, as indicated.

The third group of figures on the page entitled "1916 to 1923, Inclusive" shows that for the eight years of that period 1916 to 1923, there was a total of $23,724,000 of adjustments. That shows adjustments which added $23,724,000 to profits found in the column "Total." It shows $84,169,000 deductions from profits. It shows total gross adjustments of $107,893,000, and with those adjustments, the additions and subtractions, did not offset each other by $16,445,000, the deductions from gross profit being in excess of the additions by that amount. These totals were broken down on the sheet to show, separately, for telephone apparatus, lead covered cable and supplies, and also each of those total adjustments for each of the separate classes of product, are broken up into those adjustments which come under the category of manufacturing surplus and current underrun, and those that come under the category of revaluation and reserves.

I have purposely made this break-down so as to compare the figures shown on this Exhibit X-35 with the figures shown on Mr. Gregory's exhibit, which has been identified as D-80.

The figures corresponding to these which I have just given for the years 1916 to 1923, are shown in each separate grouping for the period from 1916 to 1925, 1916 to 1926, 1916 to 1927, 1916 to 1928, 1916 to 1929, 1916 to 1930 and 1916 to 1931. These dates just given, mean that I started off [fol. 7284] with 1916, and showed the adjustments from 1916 to 1923, and then added another year, and showed the effect of that on the total. Then I showed the effect of the adjustments for 1925, and similarly for each year thereafter, until I reached the total, from 1916 to 1931, inclusive. It covers not only the adjustments, but the total factors in the main groups, making up the gross profit. The years 1923 to 1930, and 1921 to 1930 (shown on page 1) are the same years which were covered by the exhibit prepared by Mr. Gregory in connection with the discussion of the .2 per cent variation in costs, and identified as Defendants' Exhibit D-80.

Exhibit X-35 shows that for the period 1916 to 1931, inclusive, there were adjustments which resulted in additions to profit in the factory of $109,415,000 and adjustments which resulted in deductions of $163,873,000, or total adjustments of $273,288,000. This figure of $273,288,000 is merely the factory adjustments. It is the manufacturing surplus and current underrun, but not including inventory, revaluation and reserves, excepting as they enter into the factory. The standard shop cost of sales is the basis upon which this $273,288,000 of adjustments, are allocated between the Bell and the non-Bell business. They are also allocated on the basis of sales between Illinois Bell and the Bell System as a whole, and between the Chicago Division and the Illinois Bell as a whole.

For the period from 1916 to 1931, Exhibit X-35 shows, that the additions and deductions did not balance out to the extent of $54,458,000, the deductions being in excess of the additions by that amount.

We found that the net differences, in the period from 1916 to 1925, between the adjustments, which increased and the adjustments which decreased the gross profits became greater, and reached the peak in 1925. From 1925 to 1931 the adjustments which lead to additions in gross profit exceeded the deductions, so that by the end of 1931 the net difference between the additions and the deductions declined from $73,884,000 in 1925 to $54,458,000 in 1931, in so

far as the factory profits are concerned. By that I mean, the manufacturing surplus, and current underrun.

For the period 1921 to 1930, which was the identical period covered by Mr. Gregory in his exhibit identified as D-80, [fol. 7285] we found that in the manufacturing surplus, adjustments to standard costs which added to the profits $86,515,000, and there were adjustments which resulted in deductions from profit of $80,664,000, or total adjustments which had to be separated between Bell and non-Bell customers, and between the Illinois Bell and the Bell System, and the Chicago division and the Illinois Bell, of $167,179,000.

Those additions and deductions resulted in a net difference in favor of additions, to the extent of $5,851,000, but this figure of $5,851,000 has no significance whatsoever because the $167,179,000 of adjustments was applicable to different kinds of merchandise purchased by different classes of customers, and some of the customers would be affected by the adjustments which resulted in increase of the net profits of the Western Electric to the extent of $86,515,000, and others by the adjustments which resulted in decrease of $80,664,000.

As the Western Electric prices are based upon the standard costs, and as the standard costs would result in the gross profit before these adjustments, the customers who purchased articles to whose standard costs adjustments were applicable, which resulted in addition to the profits, would have purchased articles from whose sale price the Western Electric would receive $86,515,000 more profits than the Western Electric had estimated at the time when the standard costs were established upon the basis of which the prices were made. Similarly, those customers who purchased articles during the period 1921 to 1930, upon the basis of standard cost to which the $80,664,000 of adjustments resulting in deductions were applicable, would have purchased articles whose prices were based upon standard cost figures, which resulted in profit to the Western Electric in an amount which was $80,664,000 less than the Western Electric had estimated at the time of the establishment of these standard costs upon which these prices were based.

I have made no investigation of how the Western Electric Co. prices are based, except that I have taken the testi-

mony of Mr. Gregory as being correct, that in setting the prices the standard shop costs were taken into consideration.

I have Mr. Gregory's testimony to the effect that in setting their prices, they took into consideration their standard [fol. 7286] shop costs.

(Counsel for plaintiff states that standard cost is one of the factors, but not the sole factor that is taken into consideration in fixing prices of Western Electric Company. Counsel for city stated that if counsel would permit statement to stand he would not further pursue the subject. Counsel for plaintiff agreed to let statement stand.)

I made an examination of the Gregory exhibit entitled "Statement showing the relation of manufacturing department surplus to shop output, 1921 to 1930"—D-80.

That statement purports to show that the aggregate of the adjustments which depend upon standard shop cost as a basis of allocation, 1921 to 1930, and which shows adjustments which increase and adjustments which decrease to the profits for the period from 1921 to 1930, balance each other except as to the extent of $1,833,000 or .2 per cent, the additions being in excess of the deductions by that amount; and for the period 1923 to 1930, the adjustments which added to and which resulted in the subtraction from profits in the factory balance each other excepting to the amount of $6,325,000, the deductions exceeding the additions by that amount; and that the net variation between the additions and deductions for the period 1921 to 1930 represent .2 per cent, and for the period 1923 to 1930, .7 per cent of the output.

I examined the figures shown in Exhibit D-80. I found that Mr. Gregory in that statement used the net figures, and not the gross adjustment figures. Defendants' Exhibit X-36, entitled "Summary of Details of Manufacturing Department, Surplus Items resulting in Net Figures, shown in Exhibit D-80" was prepared by me or under my direction. Defendants' Exhibit X-37 entitled "Summary of Details of Manufacturing Department, Surplus Items resulting in the Net Figures shown in Exhibit D-80 combined in Groups by Series of Years" was prepared by me or under my direction. Exhibit X-36 shows the total additions and the total deductions from gross profit, the total adjustments to gross profit, and the net adjustments to gross profit for each of

the years included in D-80, and only of the items which are contained in D-80; in other words, we have not included in X-36 any additional items of adjustment than those shown [fol. 7287] in D-80, and the purpose of Exhibit X-36 is solely to show the gross adjustments of addition and subtraction from which the net figures are derived which are shown in D-80. X-36 separates the gross adjustment making up the net figures in D-80 and the net figures in D-80 between Telephone Apparatus, Lead-Covered Cable and Supplies. The figures shown in X-36 were taken from the defendants' Exhibits, X-15 to X-35, inclusive. I will compare X-36 with D-80, for the year 1929.

There is a net deduction in D-80 which shows $1,250,000 as a deduction. Now if you will look at X-36, it appears that that $1,250,000 shown in D-80 (which is the same as the $1,249,000 appearing in the column "Total," under the year 1929, net adjustments to gross profit), is the net figure which is the result of a series of adjustments, which resulted in an increase in profit of $9,607,000, and other adjustments which decreased profits to the extent of $10,856,000, or a total of $20,463,000 of adjustments which were spread over the various items sold to the various customers of the Western Electric in unknown proportions.

The figure in D-80, $1,250,000 deductions, appears as shown from X-36 to have been the final result of adjustments which resulted in additions and adjustments, which resulted in subtractions from gross profit in the class of Telephone Apparatus, Lead-Covered Cable and even Supplies in varying amounts, and spread between customers in quantities that were unknown.

The result in D-80 for these years is revealed by X-36 to have been arrived at by the combination of the two large adjustments in the years 1924 and 1925 in Lead-Covered Cable, aggregating deductions of $13,179,000, whereas, in the other years, lead covered cable adjustments were minor, compared with the Telephone Apparatus adjustments.

X-36 shows with reference to the net adjustments in 1921, 1924 and 1925 that those adjustments which represented practically all of the gross adjustments in those years, whereas in the other years they were net adjustments, which represented a small part of the gross adjustments for those respective years.

X-37 groups the additions, deductions, total adjustments to gross profit, and net adjustments to gross profit in pe-

riods in a manner corresponding to that used by Mr. Greg-
[fol. 7288] ory in D-80. X-37 is the first group in the period shown in D-80. The extent of the difference between the adjustments that add, and the adjustments that subtract from profit will be dependent upon the particular group of years which are used in the test. We have set up in X-37 for the years 1921 to 1930, inclusive, as used by Mr. Gregory, additional groupings of two nine-year periods; groupings of three eight-year periods; groupings of four seven-year periods; and groupings of five six-year periods.

Each of these groupings are of consecutive years. From Exhibit X-37 it appears that entirely different results will be shown in each of these groupings, even though the same number of years were used, provided only different consecutive years are taken into account.

It shows that the gross adjustments vary, and the net adjustments will vary, and that the variation between the gross adjustments and the net adjustments may result in one case in additions to profit and in another case to deductions to profit. It also shows that whether you consider one or the other periods, and whether you consider the gross additions or the net additions, the significance is not in the percentage to gross output, but in the number of dollars of adjustments which must be spread among the various items and among the various customers purchasing those items to which the different kinds of adjustments become applicable.

The first group shows gross adjustments of $120,412,000 with a net variation in favor of the additions to the extent of $1,834,000.

That is the first ten-year period. On the other hand, if instead of taking the ten-year period 1921 to 1930, we take the six-year period from 1922 to 1927, we find additions to gross profit of $20,925,000, deductions from gross profit of $30,658,000, or total adjustments to gross profits of $51,583,000, as compared to the $120,412,000 for the ten-year period of Mr. Gregory.

But we find that during the six-year period from 1922 to 1927, the $51,583,000 of gross adjustments resulted in a variation of $9,733,000 in favor of the deductions from gross profit as compared with $1,834,000 shown by Mr. Gregory in favor of the addition out of a total of gross ad-
[fol. 7289] justments of $120,412,000.

For the ten-year period the net adjustment to gross profit is about 1.5 per cent of the total adjustments, whereas, for the six-year period, 1922 to 1927, it is 18 per cent of the gross adjustments.

If instead of taking the ten-year period of Mr. Gregory, which resulted in $1,834,000 of variation in favor of the additions, he had taken the nine-year period, 1922 to 1930, the result would have been that with less than $8,000,000 difference in the gross adjustments between the nine-year period and the ten-year p-riod, the net adjustments for the nine-year period were $5,779,000 in favor of the deductions as against $1,834,000 in favor of the additions in the ten-year period, or a difference of more than $6,600,000 in the net figures from a difference of $7,500,000 in the gross figures.

Defendants' Exhibit X-38 — "Comparison of 'Total Amount of Manufacturing, Inventory and Reserve Adjustments, with amounts thereof included in Exhibit D-80," was prepared by me or under my direction.

It shows the comparison of the total amounts of manufacturing inventory and reserve adjustments with the amounts thereof included in D-80. This shows for each year the total amount of the adjustments divided between the additions and the deductions from gross profits, the total adjustment to gross profit which the Western Electric actually had and the portions thereof of which Mr. Gregory included in his Exhibit D-80.

Defendants' Exhibit X-39, entitled "Division of Operating Surplus, Total Apparatus and Equipment, and Lead-Covered Cable, 1921 to 1930, inclusive" is the sheet which Mr. Gregory furnished as the study which he testified he prepared at the time he prepared D-80 and which was to show that the labor adjustments, taken separately, balanced out during the period, and the material adjustments balanced out during the period and the overhead adjustments balanced out during the period, each separately as well as collectively.

I have checked the figures shown on Exhibit X-39 with the binders and the figures of adjustment furnished by the Western Electric, and shown in Defendants' Exhibit X-36. [fol. 7290] I found that the figures shown in the last three columns of X-39 are in each case net figures and are the result of combinations, of adjustments which increase and

of adjustments which decrease profits. Similarly, the column "Total" is the sum of sub-totals of net adjustments.

For the reasons I have already given, the important figures are the gross adjustments and not the net adjustments, where more than one kind of item is manufactured, and where more than one customer purchases the various items in varying quantity.

The column "Process Merchandise" does not mean "material." It means the account wherein the Western Electric each month carries the labor and material on merchandise is course of completion. Therefore, the figures in the column are the net result of a combination of labor, material and overhead adjustments.

The effect of spreading the combined results of the adjustments to labor, adjustments to material, and adjustments to overhead, between the Bell and non-Bell customers, according to the cost of sales is, that it must be assumed that the cost of the sale of the merchandise sold to Bell customers bears the same ratio to the cost of the sales of the merchandise sold to non-Bell customers, as the adjustments to bring such cost of Bell sales from standard to actual costs bear to the adjustments which bring the non-Bell merchandise to actual cost. Such a condition would only exist if Bell and non-Bell customers bought, during each period, proportionate quantities of each and every kind of merchandise, or in combinations which would bring about the same result.

The effect with reference to the purchases of the Illinois Bell Telephone Company would be that in order that the purchases by the Illinois Bell should bear their proper proportion of the adjustments which are applicable to the Bell System as a whole, as a result of a distribution based upon the ratio of sales of telephone apparatus, lead-covered cable and supplies by the Western Electric to the Illinois Bell compared with the sales to the Bell System as a whole, it would be necessary that the amount of sales of merchandise sold to the entire Bell System bear the same ratio to the amount of sales to the Illinois Bell as the adjustments to bring the standard cost of the merchandise sold to the Bell [fol. 7291] System to actual cost, bear to the adjustments which bring the Illinois Bell standard cost of merchandise to actual cost. Such would only be the case if Illinois Bell and the entire Bell System during each period bought pro-

portionate quantities of each and every kind of merchandise or in combinations which would bring about the same result.

If the amount purchased by the Illinois Bell, or by the Bell System, were changed in any one year to be other than the amounts which the Western Electric actually sold, either by increasing or decreasing the purchases of particular items in reproducing the property on the basis of the prices of any year, the ratios between the Illinois Bell and the Bell System of sales and of adjustments would be entirely different than the ones which would exist under the conditions which prevailed in respect to the purchases actually made in building up the existing property.

Defendants' Exhibit X-40 was prepared by me or under my direction.

It is entitled, "Graph showing variation between standard cost and actual cost of purchases of lead by the Western Electric Company for the Hawthorne Works," and I think the exhibit is self-explanatory.

Defendants' Exhibit X-41 is a graph entitled "Graph showing the variations between standard cost and actual cost of purchases of copper bars by the Western Electric Company for the Hawthorne Works," was prepared by me or under my direction. I have no comment to make on that. I think it is self-explanatory.

Defendants' Exhibit X-42 entitled "Graph showing variation expressed in percentages between standard cost and actual cost of purchases of lead by Western Electric Company for Hawthorne Works"; data taken from Hawthorne M. C. 2.014 reports, was prepared by me or under by direction. That explains itself.

Defendants' Exhibit X-43 entitled "Graph showing comparison between standard cost and actual cost of purchases of copper bars by Western Electric Company for Hawthorne Works" was prepared by me or under my direction. That explains itself.

Defendants' Exhibit X-44 entitled "Graph showing com-
[fol. 7292] parison between standard cost and actual cost of purchases of lead by Western Electric Company, Inc. for Hawthorne Works," was prepared by me or under my direction. It is self-explanatory.

Defendants' Exhibit X-45, "Graph showing comparison between standard cost and actual cost of lead purchases by Western Electric Company for Hawthorne Works per

hundred pounds'' was prepared by me or under my direction. I think it is self-explanatory.

Defendants' Exhibit X-46 entitled ''Graph showing variation expressed in percentages between standard cost and actual cost of purchases of copper bars by Western Electric Company for Hawthorne Works'' was prepared by me or under by direction. I think it is self-explanatory.

Defendants' Exhibit X-47 entitled ''Graph showing comparison between standard cost and actual cost of copper bars purchased by Western Electric Company, Inc., for Hawthorne Works, per hundred pounds'' prepared by me or under my direction. It is self-explanatory.

Defendants' Exhibit X-47A entitled ''Standard Cost per hundred of selected items,'' etc., ''of indicated years for Hawthorne Plant'' was prepared by me or under my direction, and taken from the records of the Hawthorne Plant. That shows merely the dates when these standard costs for the particular items were changed. It is an extraction of selected items from the bulletins of the different years with the dates when they were adopted.

The cost of sales after the year 1925, as they were used in Mr. Gregory's exhibits, and as I used them, included only the cost of sales by the Western Electric, as they left the Western Electric, and not the cost of sales as it left any of the subsidiaries of the Western Electric.

And similarly the cost of sales before 1925 for export or otherwise represented the cost of sales by the Western Electric and not by the subsidiaries, such as the International Western Electric.

(Exhibits identified by Mr. Hagberg offered in evidence. Objections reserved until after cross-examination.)

[fol. 7293] Cross-examination.

By Mr. Thompson:

Whether I am making an apportionment or adjustment with respect to shop variation or other adjustments on gross or net variations and adjustments, I have to have some yardstick to do it by.

In other words, if we have a net shop variation of $1,000,000 and I am going to apportion it, I have to use a yardstick. If we have a gross variation plus of $10,000,000 and a gross variation minus of $9,000,000, we still have to have

some yardstick on which to make that apportionment for both of those adjustments.

I do not mean to say, that any effort was made by Mr. Gregory, or has been made by the Company, to apportion the shop variations or other adjustments between these various Bell Associated Companies, or to the Illinois Bell or to the Chicago area.

What they have done is to find out after these adjustments have been made, what the net profit of the Western Electric Company was on its Bell and non-Bell business, and then made the effort to ascertain what the net profit was on the business done with the Illinois Bell and with the Chicago area respectively.

The Western Electric has conducted a very large manufacturing business during all of the years involved in my exhibits.

Subject to check, the following figures are correct:

The sales of the Western Electric Company to its Bell customers for the period 1916 to 1931 were $2,135,000,000, and to its non-Bell customers, $233,000,000 during the same period, or a total, 1916 to 1931 of $2,368,000,000 worth of manufactures. Out of that total volume of sales of nearly $2,500,000,000, $80,000,000 were special commercial products, leaving $2,288,000,000 worth of sales, 1916 to 1931 by the Western Electric, referring all the time to the Western Electric manufactured articles of telephone apparatus, exclusive of special commercial products and lead-covered cable.

"Q. Now, broadly speaking, this telephone apparatus that I have been talking about consists of Central Office [fol. 7294] equipment and sub-station apparatus, including transmitter, receivers and induction coils, does it not?

A. I am not familiar with their products.

Q. Well, you have examined these apportionments, and you know the telephone apparatus where the shop variations occur consist of Central Office equipment and sub-station apparatus largely?

A. I know it includes——

Q. You know that from the records, do you not?

A. I know it includes telephone appliances.

Q. Exactly. And that the same general class of apparatus is sold alike to Bell and non-Bell customers—telephone apparatus?

A. I have not examined the sales at all.

Q. All right.

A. As to the——

Q. Well, then, you do not express any opinion on that question at all?

A. I express no opinion as to how much—or what classes of sales were made to one customer, or another customer.

Q. I see. You know nothing at all about that?

A. No."

Subject to check, the total sales of the Western Electric manufactures to Bell, $1,660,000,000, and to non-Bell $154,000,000 or total sales of $1,814,000,000, of which only $77,000,000 were special commercial products, leaving a balance of Western Electric manufactures sold during that period to its Bell and non-Bell customers, consisting of telephone apparatus, and lead-covered cable, of $1,737,000,000.

I inquired of the accountants of the Western Electric Company whether they had an accounting system by means of which they could apportion these various shop variations and adjustments to each of the hundred thousand or more than one hundred thousand articles manufactured by the Western Electric Company.

I made that inquiry for the purpose of finding out whether there was any actual cost used in addition to the standard cost.

"Q. You knew before I inquired that the maintenance of such a system would be so absurd and expensive that [fol. 7295] no manufacturing company would consider maintaining it, did you not?

A. I did not take that into consideration at all."

I have had wide experience as an accountant, and have knowledge of the cost of accounting work in places where I have investigated, but not the cost of accounting in places which I have not made any investigation of.

I have gone over these records of the Western Electric Company in great detail.

I could not give an estimate, as an accountant, as to what additional cost in millions of dollars per year would have been incurred by the Western had it maintained the kind of an accounting system, that I asked the Western Electric whether it maintained, without making a survey of the plant, and the present cost methods, and the operations in detail.

I would not venture a guess on it; it would be simply a guess, if I did.

I haven't the slightest idea whether it would be millions of dollars per year because I do not know what it has, what the detail records are. We might be able to use some of the detail records, and we might not.

In referring to the basic gross profit and adjustment figures back in 1924, I did not want to convey the idea that I was denied access to them, because what I meant to say was that repeatedly requests were made for that division between the Bell and the non-Bell, and the matter was delayed from time to time, so far as I was concerned, until I finally got the information that those figures had not been prepared by the Western Electric Company, but the data on which they could be made would perhaps be—or "maybe" was the word used—maybe prepared if they were still in existence at the Hawthorne Plant, or any of the other locations, but I had no assurance whether they were in existence or were not in existence.

Counsel reads part of telegram sent to Mr. Goldstein April 5, 1932 as follows:

"All details to the extent that they are now in existence, which were back of the reports made to the comptroller for the years prior to 1924 in which basic gross profits and adjustments appear, are located at the Hawthorne Works and at our various distributing locations. We will make such [fol. 7296] details available for inspection at places where they are located when you advise us that you desire to proceed."

I saw the telegram.

"Mr. Goldstein: You know there is a telegram there which states that you did not even know if they were in existence.

Mr. Thompson: Certainly, I have no objection to the introduction of other telegrams or letters pertinent to this."

I made no application; I did not go to Hawthorne to find out whether they were in existence.

The reason we did not go out there at that time was that this was toward the end of the investigation, and they were ready to go on trial with it, and we did not have the time to go out, especially in view of the fact that it was doubtful whether those records were in existence or not.

I have no reason to presume that they would have been denied if they could have given us what we asked for if they could have produced them.

I think there is some more information than was read to me.

I have not checked into the profit figures to ascertain the total profits of the Western Electric Company for any of these years or for any group of years.

The figures that I have presented here in the exhibits, the aggregate profit for the entire Western Electric, as well as the sub-classes of telephone apparatus, lead-covered cable and supplies, and the additions between Bell and non-Bell, have been taken from the statements in the binders without verification as to the books, but I have no reason to doubt the correctness of them; neither will I certify to the correctness of them.

The only problem that I have here is the apportionment of allocation of profits as between the Bell and the non-Bell business. I qualify that statement to the extent I was not so much concerned in the aggregate profits of the Bell or non-Bell as I was in the possibility—or the method used in the dividing of the gross profits into the several kinds of apparatus, or appliances, made and sold by the Western Electric Company.

In other words, I was more concerned with the gross profits than anything else.

[fol. 7297] The term basic gross profit is not so used in the subdivisions as shown in our profit and loss account there, because I have taken the understanding that the Western men had, of what should be designated gross profit, what should be manufacturing surplus and current underrun, and what should be inventory revaluation and reserves. I followed absolutely their division of profits to the extent of including under basic gross profit an item of unexplained difference of $1,800,000.

What is termed basic gross profit as used in these exhibits which I have identified is supposed to be the difference between shop cost and sales prices,—the aggregate of standard shop cost and sales price. For 1929 there is a complete analysis, an analysis as made by the Western Electric, showing what is included in the Western gross profit.

That is included in Exhibit X-16.

That explains fully the use of the term "Basic gross profit" as taken bodily from the company's analysis of gross

profit, and has been classified as basic gross profit after cooperation and work with the representative of the Western Electric Company.

All that one needs to do, where it is desired to know the definition of basic gross profit as used in all these exhibits, is to turn to Exhibit X-16.

But it should not be understood that that is the segregation that I would perhaps have made after a lengthy investigation. For expediency sake, we simply got together and worked it out.

From examination of the records of the Western Electric Co. it appears that these shop variations and these adjustments gross and net which I have in my exhibits were ones which were currently made by the Western Electric Company from year to year in its business as it proceeded.

Redirect examination.

By Mr. Goldstein:

I found that the analysis of gross profit seemed to be a little bit more complete, and a little bit more in detail in the later years than in the earlier years.

The $1,800,000, with the unexplained difference that I testified about, was in 1929. The difference between the adjustments that they explained in detail, and the total left an [fol. 7298] unexplained difference of that amount.

When I started to work out at Hawthorne, I asked for, and received and examined the Q2.02-1 reports which showed the sales and standard cost of sales, and which is identified as Defendants' Exhibit D-44.

When I went to New York within the last few weeks, I also examined the similar reports for the other plants.

That analysis in Exhibit D-44 showed the various subdivisions and sub-classes of the main classes that make up the total of their sales, and the cost of sales.

"Mr. Thompson: In connection with Mr. Cummings' testimony, an offer was made by the defendant of Exhibit X-13, among others. The plaintiff objects to the introduction in evidence of Exhibit X-13 which consists of two sheets, one of them purports to be a comparison between Mr. Gregory's statement D, and apparatus prices as used in the Sloan appraisal for central office equipment, station apparatus, and P. B. X. The second page purports to be a comparison

between the Western Electric experience taken from certain costs indices of Mr. Burgess, and the Sloan appraisal.

I think two things are perfectly clear from the testimony of Mr. Cummings. The first is that these are not in fact comparable, neither one of these comparisons attempted to be made. I think his admissions are broad enough to show non-comparability. The second proposition, I think there can be no doubt about, he has never shown comparability, and it seems to me very clear that this exhibit ought not to be permitted to go into evidence.

Judge Wilkerson: What do you think about it?

Mr. Goldstein: I will say this, that it is rather odd that, after they have presented their entire Western Electric presentation on the basis that the Illinois Bell is a fair cross-section, that the prices of the Bell System as a whole, are to be taken into account, and the costs, and it is then a question of taking a percentage, and now, after they have furnished us the evidence, and we make use of it, that they should object to it. Now, we will ask that the Burgess index numbers be offered here, we have asked for that, and it has been produced, and it is with an agreement that it be made available when we want it; and we want it. If we [fol. 7299] use the very basis they have used in the Western Electric presentation, particularly since Mr. Sloan used Western Electric prices, I cannot see any possible reason for objecting to it, unless they object to their own method of proof. Mr. Sloan has used installation costs, the Western Electric installation costs, and he has used,—he says he has used those prices and he has used those installation costs.

Mr. Thompson: Of course the trouble with Mr. Goldstein's argument is, it is predicated upon the proposition he has taken two things that comprehend like articles. In the Gregory trend are receivers, transmitters and induction coils of the years. In the Sloan trend, on the other side, there are no receivers, transmitters or induction coils prior to 1928, because they were not owned by the Illinois Bell. In the Gregory trend there are loading coils, and there are repeater installations, and of course, they are wholly omitted from the three accounts selected for the classification from Sloan.

In Sloan's trend there is all the reissued Class C stock, there is none of it in Gregory's trend. In Gregory's trend there is the A. H. material, remanufactured by the Western,

and there is a qualified admission by Mr. Cummings that it may not all be in the Sloan trend.

So the trouble is, we have a theory, and I think we have proved it to be true, that the Illinois Bell is a fair cross section, but they don't take and make the comparison on that basis. They select out three accounts that are wholly non-comparable with Sloan's trend."

(Objection; overruled.)

"Mr. Thompson: Your Honor, we offer in connection with Mr. Cummings' testimony the exhibits which were identified on cross-examination, which are numbers 212, 213, 214 and 215. Do you want to know what they are, Mr. Goldstein?

Mr. Goldstein: Yes.

Mr. Thompson: 212 is the Representative Weighted Plant of the Indiana Bell Telephone Company. 213 is the specific estimates that was discussed during Mr. Sloan's testimony, number 22150. 214 is a duplicate of Exhibit 50 introduced by Mr. Sloan on the first trial of this case. And 215 is the work sheet of Mr. Cummings, which he used in connection with the material costs of exchange pole lines.

[fol. 7300] Mr. Goldstein: To the first one, I certainly object, because the witness has testified he had not prepared it, and he did not offer it, and he did not testify about it, and he doesn't know anything about it. That was in the Indiana Bell Telephone case, it was an Indiana Bell Telephone case Exhibit, it wasn't his. It has nothing to do with the case.

(Plaintiff's Exhibits A-212, A-213, A-214 and A-215, and Defendants' Exhibits Nos. X-15, X-15A, X-15B, and X-16 to X-47A, inclusive, identified by Mr. Hagberg, offered and received in evidence.)

(Objection to Plaintiff's Exhibit A-212; overruled.)

George B. McCann, a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Goldstein:

June 7, 1932.

My name is George B. McCann. I reside at Bloomfield, New Jersey. I am employed by Touche, Niven & Company,

public accountants, New York City, as a supervising senior accountant. I have been associated with that company for the past six and a half years. Prior to that I was associated with Klein, Hinds & Finke, certified public accountants, also of New York, for a period of four years. Before entering the public accounting field, I was employed in private accounting work by various commercial concerns. I am a graduate of New York University. I am a certified public accountant of the State of New York. My duties consist principally of the conduct of audits and investigations of large mercantile and manufacturing organizations. I am employed by the City of Chicago in connection with the presentation of the portion of its case relating particularly to the Western Electric exhibits.

The exhibits which are to be offered, beginning with X-48, were prepared by me or under my supervision, in so far as they contain computations.

X-48 is entitled "Average investment, net profits and percentage of return (Per Exhibits A-77 and A-79)—Bell and non-Bell business for the years 1916 to 1930." Exhibit X-48 shows the return on the investment in Bell and non-[fol. 7301] Bell business combined, using the figures appearing in Plaintiff's Exhibits A-77 and A-79.

I have made no change in those figures. I have just added the corresponding figures together. Exhibit X-49 consists of three pages. Page 1 is entitled "Western Electric Company, Inc. Average investment per Exhibits A-77 and A-79 adjusted to exclude excessive cash, current liabilities, reserve for Pension Fund and reserve for depreciation—Bell and non-Bell business"; page 2 is entitled "Average investment per Exhibit A-77 adjusted to exclude excessive cash, current liabilities, reserve for Pension Fund, and reserve for depreciation—Bell Business"; and page 3 is entitled "Average investment per Exhibit A-79 adjusted to exclude excessive cash, current liabilities, reserve for Pension Fund and reserve for depreciation—non-Bell business." These were prepared under my supervision.

Page 1 relates to the Bell and non-Bell business combined. Page 2 relates to the Bell business only, and page 3 relates to the non-Bell business.

The column headed "Average Investment" is similar to the column shown in Exhibit X-48, that is a combination of the investment appearing in Plaintiff's Exhibits A-77 and

A-79. The column "Excessive Cash" represents the amount by which the average cash balances used in the compilation of Exhibits A-77 and A-79 exceeded the normal cash working balances for the Western Electric Company as shown by the report CR-714 of that company, which I examined.

The column "Notes payable—Others" represents the average indebtedness to banks and others on notes payable. These liabilities are listed in the annual reports of the Western Electric Company as current liabilities and they correspond to the class of liabilities which are included under current liabilities in Poor's and Moody's and in the annual reports of the industrial companies, including the eighty-eight companies shown in Plaintiff's Exhibit A-85.

Exhibit X-49½ is a sheet taken from Poor's 1930 Manual, entitled "Public utilities (Western Electric Co., Inc.)" That sheet, at the bottom, under "Statement of working capital, December 31," under "Current Liabilities," includes the class of liabilities which I have included in my "Payables—Others."

[fol. 7302] There were notes payable that I have shown in the third column, "Others," in X-49 which were not excluded from the investments as calculated by Mr. Gregory in Exhibits A-77 and A-79. The column "Notes payable—Trustees of Pension Fund" represents the average indebtedness to the trustees of the Pension Fund under "Notes payable." In the year 1928, these notes were included under "Notes payable—Others"; we make no distinction between these notes and the notes payable that are listed under "Others." They fall in the same category, and, therefore, are excluded from the average investment.

The column "Reserve for Pension Fund" (fifth column, page 1 of Exhibit X-49) represents the amount that is set aside out of profits to take care of future pensions of employes.

The additions to this reserve are charged against profits in each year, and the fund is so built up that it does not participate any further in the profits of the company. The reserve is excluded from the average investment used to determine the percentage of return. That is, it is excluded in our computation, as otherwise the stockholders would be

profiting to the extent that the pension fund was included in the average investment.

Subsequent to 1927, the Pension Fund accruals were built up to participate in additional earnings only to the extent of the interest which is paid to the trustee of the Pension Fund. In those years, where the notes to Trustees are deducted, the interest is likewise excluded from our computation of operating earnings.

That is, I took out from the operating earnings as shown by Mr. Gregory, an additional deduction of interest to the Trustee under the Pension Fund, charged it to the operating earnings, and then I excluded from the rate base the amount of the principal in the obligation to the trustee of the Pension Fund. The column, "Working reserves (part interest and taxes part accounts payable)" represents principally accrued expenses which are properly classified as current liabilities. The distinction between this class of liability and accounts payable is a purely technical one, as there is no real distinction between a recorded account payable and an accrued expense to take care of some in- [fol. 7303] curred liability for which no recorded invoice has been entered. The entire amount of the liability has been charged against earnings. I examined Mr. Gregory's working papers for the years 1916 to 1925. I found that in the years 1916 to 1925, that those working reserves were not shown as such, but were included under the caption "Accounts payable" and were, therefore, deducted, in arriving at the average investment shown in Exhibits A-77 and A-79. That is, he deducted them from the rate base from 1916 to 1925, but not from 1925 to 1932.

The next column "Total adjustments" represents a total of the adjustments which have previously been described, beginning with Excess Cash and ending with Working Reserves. That is just a total of the preceding column of figures.

The column "Average investment before depreciation per Exhibits A-77 and A-79 adjusted," represents the average investment shown in those two exhibits after the deduction of the column "Total adjustments." That is, it just gives effect to the adjustments.

The column "Reserve for depreciation" represents the average reserve for the depreciation of plant, giving effect to the exclusion of extraordinary and excessive depreciation, the details of which are given in a later exhibit, X-50,

entitled "Reconciliation of Net Profits per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, with Profits as Adjusted—Bell and Non-Bell business." That is, I will show later that the expenses of the Western Electric as shown by Mr. Gregory were adjusted, and I give effect here to the rate base resulting from that adjustment.

The column headed "Average investment after depreciation" is the average investment per Exhibits A-77 and A-79, after deduction of the column "Total adjustments" and the column "Reserve for depreciation."

The differences between Mr. Gregory's method used in deducting depreciation reserve in A-194 and in X-49-A, entitled "Earnings of Western Electric Company on Non-Bell business expressed in percentages of Sales and in percentage of (a) Average Investment, and (b) Average Investment less amount of Depreciation Reserve Account 1916-1932, Inclusive," and the method used in Exhibit X-49 are, first, Mr. Gregory deducted the depreciation reserve [fol. 7304] shown by the books, which included the extraordinary depreciation set up in the years 1924, 1925, 1926, 1927 and 1928.

Exhibit X-49 has a smaller depreciation reserve because of the exclusion of this so-called extraordinary depreciation.

The second difference is that in compiling his average reserve for depreciation, Mr. Gregory used the opening and closing figures for each year, that is, December 31st figures, divided by two.

In Exhibit X-49, in the earlier years, the opening and closing figures were used because there were no other figures available; but in the later years, where monthly averages were available, we used the monthly figures to arrive at a more accurate figure.

I do not believe that the variance between the two figures, that is, Mr. Gregory's, and those shown in X-49, would be very significant.

The third difference is a method of allocation between Bell and non-Bell. Mr. Gregory used a detail method, involving a knowledge of the amount of depreciation reserve which was allocable to a particular class of plant used in Bell and non-Bell business.

At the time that we made our examination of the records, we did not find, nor was any data made available to us, whereby we could distribute the depreciation reserve as

between various classes of equipment, or as between Bell and non-Bell.

For that reason, we distributed the depreciation reserve on the basis of allocation of plant which has been used by Mr. Gregory in preparing the investment figures building up Exhibits A-77 and A-79.

Exhibits A-194 and X-49-A, were delivered to me after my computations were all made up that entered into X-49, and the explanations were given by the Western Electric as to the method in A-194 and X-49-A, at or about the time when they delivered those documents. I don't think the difference caused by the allocation method used by Mr. Gregory relating to this factor allocating the plant would materially affect the result. I think the only real difference between Mr. Gregory's figures and the figures in Exhibit X-49 would result from the exclusion of the extraordinary depreciation reserve.

Page 2 of Exhibit X-49 is similar to page 1, except that [fol. 7305] it relates to Bell business only, as shown in Exhibit A-77. That is, page 2 allocates to the Bell business the portion of the adjustments, the total of which is contained on page 17.

Page 3 allocates to the non-Bell business the portion of the adjustments, the combination of which, Bell and non-Bell, is shown on page 17, and shows on pages 2 and 3 the effect of the rate base in each case for Bell business and non-Bell business.

The allocation between Bell and non-Bell on pages 2 and 3 of X-49, we made in this manner: The cash and payables were apportioned between Bell and non-Bell on the same basis as the cash and payables were apportioned by Mr. Gregory in arriving at the investments shown in Plaintiff's Exhibits A-77 and A-79.

When I said that the cash and payables were apportioned, I meant the excess cash.

The reserve for depreciation was apportioned on the basis of the plant which was allocated to Bell and non-Bell by Mr. Gregory in connection with Exhibits A-77 and A-79. For this purpose I adopted his apportionment of the assets, as a basis for apportioning the reserve.

Exhibit X-50, entitled "Reconciliation of net profits per Exhibits A-77 and A-79 with profits as adjusted—Bell and non-Bell business," on page 1, and page 2, "Net profits per Exhibit A-77 as adjusted—Bell business," page 3, "Re-

conciliation of net profits per Exhibit A-79—non-Bell business with profits as adjusted," shows a reconciliation. This exhibit of three pages was compiled by me, under my supervision.

Page 1 applies to the Bell and non-Bell companies combined.

Page 2 applies to the Bell business only, and page 3 to the non-Bell business.

On page 1, column 1, "Net profits per Exhibits A-77 and A-79" corresponds to the similar column in X-48. The next column, headed "Pension Fund Accruals" represents the adjustment of profits by reason of substituting for the pension appropriations charged on the books of the company, the pension requirements as shown by an actuarial computation furnished us by the Western Electric [fol. 7306] Company, and now identified as Exhibit D-26.

Mr. Gregory's Exhibits A-77 and A-79 included in the years 1925 to 1929, charged as operating expenses, not only the current requirements for the pension fund as shown by the actuarial study, but also amounts to make up deficiencies of prior years.

In Exhibit X-50, the charges for pension fund have been reapportioned to charge the operations of each year with the amount of pension fund shown to be required by the actuarial studies. In making this adjustment, the full amount of the actuarial requirements for the fifteen-year period was used, which is in excess of the amounts charged on the books, and in excess of the amounts used in the compilation of profits shown in Exhibits A-77 and A-79. The amount which is charged as an operating expense during the fifteen-year period exceeds the amount which Mr. Gregory charged for the same period in Exhibits A-77 and A-79, in the amount of $359,000.

What I did there was to take the figures as I found them in the actuarial computation, and merely distribute them in the years in which they were supposed to have the deficiency. With reference to the similar item in the case of the eighty-eight companies shown in Exhibit A-85, I found that it was customary to charge to surplus similar adjustments which made up deficiencies of prior years.

In an exhibit to be offered later, X-94, such a provision appears as a surplus charge in the Dupont Company, such surplus adjustments aggregating $8,600,000 made in the year 1926 and in the year 1929. No effect is given in my

calculations to the possibility that the pension fund reserve at December 31, 1930, is excessive in the light of the depression, and that excess could have been used to make up deficiencies which I have charged against the operating earnings of the years prior to 1924.

(Counsel for defendants admits witness does not testify as an actuary. Motion of plaintiff to strike out the statement of the witness just made, on the ground that he has not qualified as an actuary, and therefore cannot express any opinion about it.

Court rules that it may stand as a matter of accounting only.)

[fol. 7307] The next column headed "Extraordinary Depreciation" represents the depreciation taken by the company in the years 1924, 1925, 1926, 1927 and 1928, as a reserve against probable shrinkage in reproduction value of the plant, predicated on the estimated price level for the ten-year period 1931 to 1940.

In my examination of Exhibits A-77 and A-79, and the working papers underlying Exhibits A-77 and A-79, I did not find any figure, or any calculation, or any fact therein which showed that there was any shrinkage in book value used by Mr. Gregory as a rate-base below the book cost during the period subsequent to 1924, 1925 and 1926.

(Defendants' Exhibit D-27 furnished to defendant by plaintiff offered and received in evidence.)

In my examination of A-77 and my examination of A-79, or in the examination of any of the records, or in the examination of the working papers underlying A-77 or A-79 I did not find in A-79 any computation, or any figure which showed that Mr. Gregory used as his rate base a figure for the plant or the equipment, any figure below book cost, in computing his rate of return. Among the eighty-eight companies which are shown in A-85, Mr. Gregory's exhibit, I found that charges similar to this reserve were made as adjustments against surplus rather than against current operation. That will be shown in Exhibit X-94 later.

I did not distribute the two million dollar deduction, for the period over the years 1924 to 1927. I did not distribute it for the reason that in the years 1924 to 1927 the company used a rate of seven and one-half per cent as depreciation on its machinery, in conformity with the general practice

of manufacturing companies, as shown in the case of the eighty-eight companies, as will be shown on an exhibit to be offered later, X-93.

"Q. As a basis of comparison with those companies, will you state whether the Western Electric made a claim to the Internal Revenue Department for deduction of this two million dollars, as an operating expense, either in the year '27, or in the year '28?"

(Objection by plaintiff on the ground that the question of what claim may or may not have been made by the West- [fol. 7308] ern Electric to the Department of Internal Revenue in connection with depreciation can have no bearing upon the actual facts of depreciation existing in the plant. Counsel for defendants stated that the question was limited to the sole purpose of comparing this company's practice with those of the eighty-eight companies, which show that they do follow the rules of the Internal Revenue Department. Objection overruled.)

The company did not make such a claim. The next column "Excessive Depreciation" represents the adjustment resulting from spreading the charges for small tools, and furniture and fixtures over a four and six-year life, instead of charging off the entire purchase in the years in which made, as is the practice of the Western Electric Company. The adjustment which has been made in Exhibit X-50 conforms to the amounts of depreciation allowed by the Internal Revenue Department.

(Counsel for defendants states that the above statement will stand for the sole purpose of the comparison, and nothing else.)

The column "Federal Income Taxes" represents the adjustments to profits by reason of allocating the Federal Taxes paid to the years to which they apply, rather than to the years to which the charges were made.

The next column "Total Adjustment" represents the total of adjustments as they have been previously described. The next column "Profits as adjusted before interest deductions" represents profits per Exhibits A-77 and A-79 adjusted by the amount appearing in the column "Total adjustments."

The next column, "Interest to current obligations" represents the amount of interest paid which is applicable to

current liabilities. This was deducted from profits, for the reason that the current liabilities were deducted in arriving at the average investment. By so doing, I reduced the profit shown by Mr. Gregory to the extent of this interest.

The next column "Interest on excessive cash balances" represents an adjustment to exclude from profits the estimated amount earned on the excessive cash balances which were excluded from the average investment in Exhibit X-49. To that extent, I reduced net profits available for return, as shown by Mr. Gregory.

[fol. 7309] The next column, "Profits as adjusted," represents the final adjusted profits after deduction of interest on current obligations and excessive cash balances. Page 2 is similar to page 1, except that it applies to A-77, Bell business. The same explanations apply to the deductions on this sheet as to page 1.

Page 3 is similar to X-50, page 1, except it applies to Exhibit A-79, non-Bell business. The explanations given for page 1 are equally applicable to page 3. In allocating the adjustments between Bell and non-Bell business, I followed as closely as possible the basis of allocation used by the company in preparing Exhibits A-77 and A-79, so as to give effect to the factors of adjustment alone, without taking into account the propriety of the method of allocation used. That is, I am just making the allocation to give effect to the particular adjustments shown in X-50. Exhibit X-51, page 1, is entitled "Return on average investment per Exhibits A-77 and A-79 adjusted to exclude excessive cash, current liabilities and reserve for pension fund—Bell and non-Bell business." Page 2 covers the same thing, entitled "Return on Average Investment per Exhibit A-77 Adjusted (before Depreciation) Bell Business (Dollars in Thousands)," only limited to Bell business; and page 3, entitled "Average Investment, Net Profits and Percentage of Return on Investment—non-Bell Business," limited to the non-Bell business. Exhibit X-51 makes the adjustment in the investment only and not in the net profits.

Page 1 shows for the Bell and non-Bell business combined, the rate of return on the average investment as adjusted before depreciation. Page 2 is the same thing for the Bell business and page 3 for the non-Bell business. The column entitled "Average investment adjusted before depreciation" conforms to the third to last column headed similarly shown in Exhibit X-49.

The column "Net profits" in X-51 conforms to the figures given in A-77 and A-79, and the combination of the two shown in X-48. The last column, headed, "Per cent return on average investment," page 1, shows combined Bell and non-Bell, page 2, Bell, and page 3, non-Bell.

Exhibit X-52, consisting of three pages, entitled "Return on Average Investment per Exhibits A-77, A-79, and Ex- [fol. 7310] hibits A-77 and A-79 combined, as Adjusted (after Deducting Depreciation) Bell and non-Bell Business," is identical to X-51, with the single exception that it makes a further adjustment by the deduction of depreciation reserve. For the purpose of X-52 I again only show adjustments on the rate base, but not in the adjustments in the net profits, as shown in Exhibits A-77 and A-79, and pages 1, 2 and 3 which represent the result of the combined business, and the non-Bell business and the Bell business, respectively.

Exhibit X-53 consists of three pages, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Profits as Adjusted and Percentage of Return—Bell and non-Bell Business," and in column 2 on each of the sheets it is intended to reflect the effect of the adjustment to profits shown in X-50, but not to show any effect on the adjustments of assets.

Page 1 shows the return on investment in Bell and non-Bell business combined, and page 2, the return on investment in Bell business, and page 3 the return on investment in non-Bell business. The column "Average investment" is in conformity with the figures given in Plaintiff's Exhibits A-77 and A-79 for the Bell business and the non-Bell business separately and combined in X-48, as there shown.

In X-53 I adopt the average investment compiled by Mr. Gregory so as to reflect the effect only of adjustment to profit shown in X-50. The column "Profits as adjusted" corresponds to the column headed "Profits as adjusted before interest deductions" shown in Exhibit X-50. The last column, then, shows "Percentage of return on Investment," giving effect to the adjustments of profits only.

Exhibit X-54, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (before Depreciation), Profits as Adjusted and Percentage of Return—Bell and non-Bell Business," consisting of three pages, shows the effect of the two adjustments, one, in the investment, as shown in X-49, and two, the adjustment in

profits as shown on X-50, only using the rate base before depreciation deduction.

Page 1 shows the return on investment in Bell business and non-Bell business combined; page 2, the return on in-
[fol. 7311] vestment, Bell business; and page 3, the return on investment in non-Bell business.

The column "Average investment adjusted before depreciation" conforms to the column similarly headed in Exhibit X-49, and the column "Profits adjusted" corresponds to the similar column shown on Exhibit X-50, and the final column shows the percentage of return, on the basis of the two classes of adjustments, one to profit, and one to the rate base before depreciation.

Exhibit X-55, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (after Depreciation), Profits as Adjusted and Percentage of Return—Bell and non-Bell business," is identical with X-54, excepting that it gives effect to the deduction of the depreciation reserve from the adjusted rate base. It shows, from the Bell business, the return on investment from 1923 to 1930 to be as follows:

1923, 4.4 per cent; 1924, 10.3 per cent; 1925, 17 per cent; 1926, 15.6 per cent; 1927, 19.6 per cent; 1928, 20.3 per cent; 1929, 17.2 per cent; 1930, 6.2 per cent.

For the non-Bell business for corresponding years, it shows for 1923, 25.1 per cent; 1924, 18.6 per cent; 1925, 5.8 per cent; 1926, 28.3 per cent; 1927, 22.1 per cent; 1928, 32.7 per cent; 1929, 44.3 per cent; 1930, 10.4 per cent.

For the combined Bell and non-Bell business for the same years, it shows for 1923, 6.3 per cent; 1924, 11.1 per cent; 1925, 15.7 per cent; 1926, 16.4 per cent; 1927, 19.7 per cent; 1928, 21.3 per cent; 1929, 20.4 per cent; 1930, 6.5 per cent.

Exhibit X-56, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Net Profit (Adjusted in Respect of Pension Accruals) and Percentage of Return—Bell and non-Bell business," consists of three pages and shows the effect on the combined Bell and non-Bell return, and on the Bell and non-Bell return separately of the one adjustment to net profits for pension fund accruals.

Page 1 shows the return on investment of Bell and non-Bell business combined with that adjustment; page 2, the return on average Bell business; page 3, the return on the

average investment in the non-Bell business, on the basis of that one adjustment to Mr. Gregory's figures.

Exhibit X-57, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted [fol. 7312] (before Depreciation), Profits (Adjusted in Respect of Pension Accruals), and Percentage of Return—Bell and non-Bell Business," is identical with X-56, excepting that it shows the effect of the adjustment for pension fund accruals applied to the adjusted rate base, per X-49, before depreciation.

Exhibit X-58, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (after Depreciation), Profits (Adjusted in Respect of Pension Accruals) and Percentage of Return—Bell and non-Bell business," is identical with X-57, excepting only that it contains the additional depreciation reserve deduction. In other words, in X-58, I show the effect of making the one adjustment of pension fund accruals on the basis of the adjusted rate base, as I have heretofore computed it, after deducting the depreciation reserve, page 1, for the combined business, and then, pages 2 and 3, for the Bell and non-Bell business separately.

Exhibit X-59, consisting of three pages, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Profits (Adjusted in Respect of Extraordinary and Excessive Depreciation) and Percentage of Return—Bell and non-Bell Business," shows the effect on the combined Bell and non-Bell investment, and on the Bell and non-Bell investment separately, of the adjustment to profits for extraordinary and excessive depreciation, as shown in X-50.

Exhibit X-60, consisting of three pages, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (before Depreciation), Profits (Adjusted in Respect of Extraordinary and Excessive Depreciation) and Percentage of Return—Bell and non-Bell Business," is identical with X-59, excepting only that it gives effect to the adjusted average investment before depreciation, as shown in Exhibit X-49.

Exhibit X-61, entitled "Average Investment per Exhibits A-77, A -79, and Exhibits A-77 and A-79 combined, Adjusted (after Depreciation), Profits (Adjusted in Respect of Extraordinary and Excessive Depreciation) and Percentage

of Return—Bell and non-Bell business," is identical with X-60, excepting that it gives effect to the adjusted average investment after deducting the depreciation in Exhibit X-49.

Exhibit X-62, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Profits [fol. 7313] (Adjusted in Respect of Federal Income Taxes) and Percentage of Return—Bell and non-Bell Business," shows the effect on the combined Bell and non-Bell investment, and also on the separate Bell and non-Bell investment, of the adjustments to profits for Federal income taxes, as shown in X-50.

Exhibit X-63, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (before Depreciation), Profits (Adjusted in Respect of Federal Income Taxes) and Percentage of Return—Bell and non-Bell business," is identical with X-62, except it gives effect to the adjusted average investment before depreciation as shown in Exhibit X-49.

In Exhibit X-64, entitled "Average Investment per Exhibits A-77, A-79, and Exhibits A-77 and A-79 combined, Adjusted (after Depreciation), Profits (Adjusted in Respect of Federal Income Taxes) and Percentage of Return —Bell and non-Bell business," I have the identical computations as in X-63, excepting that it gives effect to the adjusted average investment after depreciation, as shown by Exhibit X-49.

Exhibit X-65, entitled "Western Electric Company, Inc.—Return on Average Investment Per Exhibits A-77 and A-79, and Exhibits A-77 and A-79 combined, After Deducting Reserve for Depreciation—Bell and non-Bell Business," is identical with X-48, excepting that it gives effect to the single factor of the deduction of depreciation reserve, without giving effect to any other adjustments. It gives no effect to any profit adjustment, but merely to the deduction of the depreciation reserve from the investment, as shown by A-77 and A-79.

Exhibit X-66, entitled "Reconciliation of Net Profits per Books with Taxable Income Shown in Federal Income Tax Returns, for the Years 1916 to 1930," was reproduced from the company records, and is a reconciliation of the profits shown by the books with the profits as reported for Federal income tax purposes.

Exhibit X-67, entitled "Western Electric—Return on In-

vestment in International Western Electric Company, years 1918 to 1925" was prepared by me and under my supervision. Exhibit X-67 shows that from the organization of the International Western Electric Company to the date of the sale of that company to the International Telephone & Telegraph Company, that the Western Electric earned an average on its investment of 37.2 per cent per year. That in-
[fol. 7314] cludes the profit on the sale to the International Telephone & Telegraph Company. I included all of that profit, and allocated it to the period, 1918 to 1925.

I allocated it to the period 1918 to 1925 for the reason that the annual reports of the Western Electric Company for the years prior to 1920, show that the foreign business of the Western Electric practically ceased during the War, and that the business was operated in the years immediately preceding 1918 at a loss, and that there were large losses in the investment itself, due to wartime conditions.

This exhibit does not take into account the question as to whether any portion of the purchase price was given as consideration for any sales contract.

June 8, 1932.

Exhibits X-48 to X-66 concern the profits of the Western Electric Company on its sales to the Electrical Research Products, to Graybar, to the Northern Electric, and to the International Western Electric Company where sales were made to them, and they do not include any profits of the Electrical Research Products, or Graybar, or the Northern Electric, or the International Western Electric Company, to their customers.

(Defendants' Exhibit X-68, entitled "Agreement between the Western Electric Company, Inc., and the International Telephone & Telegraph Corporation, and the International Western Electric Company, Inc., dated August 14, 1925," and Exhibit X-68-A, entitled "Agreement between Western Electric Company, and International Western Electric Company, dated October 1, 1925," offered and received in evidence.)

Defendants' Exhibit X-69, entitled "Western Electric—Investment in International Western Electric, Years 1918-1925," is taken from the books of the company, and shows the ratio of earnings of the International Western Electric Company to the Western Electric Company investment in

the business. The per cent return for the period 1918 to 1925 is 18.6 per cent.

The difference between this exhibit and Exhibit X-67 is that X-69 includes all of the earnings of the International Western Electric, whereas X-67 includes only that portion of the earnings declared as dividends to the parent company, plus the profit made by the parent company on the sale [fol. 7315] of the International Western Electric Company to the International Telephone & Telegraph Company.

Exhibit X-70, entitled "Western Electric—Investment in International Western Electric Company, Inc., giving effect to accumulated earnings, years 1918-1925," shows the return on investment of the Western Electric Company in the International Western Electric Company, giving effect to the earnings not declared as dividends. It shows that for the period 1918 to 1925, the return on the average capital stock and surplus combined was 13.2 per cent. This exhibit does not include the profit on the sale to the International Telephone & Telegraph Company.

Exhibit X-71, entitled "Western Electric Supply Department, 1916 to 1925," was taken from reports and data furnished to us by the Western Electric Company. It shows the return on the Supply Department, treated as a separate department. The investment shown in the first column is built up according to reports on the same basis as the average investment as shown in Plaintiff's Exhibits A-77 and A-79. That is before deducting depreciation reserve and after deducting that portion of current liabilities that was used in determining the average investment as shown in A-77 and A-79.

Exhibit X-72, entitled "Western Electric—Return on Investment in Graybar Electric Company, Inc., Years 1926 to 1928, Inclusive," was taken from the company's records and represents the return on investment, computed on two bases. The first computation shows the return on investment based on the original investment as carried on the books of the Western Electric Company, and shows a return of 27.53 per cent for the three-year period 1926 to 1928, inclusive.

The second computation shows that giving effect to the surplus earnings of the Graybar Electric Company, the return is an average of 23.58 per cent for the same three-year period.

Exhibit X-73, entitled "Graybar Electric Company, Com-

parative Statement of Sales and Profits on Western Electric Manufactures and on Other Products," is a comparative statement of sales and profits on Western Electric manufactures and on other products. The sales and profits on Western Electric manufactures are taken from Exhibit D-49. [fol. 7316] The sales and profits on other products represent the difference between the sales and profits shown on Exhibit D-49, and the total sales and profits as shown by annual reports of the Graybar Electric Company.

This exhibit shows that the sales of Western Electric manufactured articles constituted approximately 15 per cent of the sales for the years 1926, 1927 and 1928 combined; and that the profits derived from Western Electric manufactures contributed approximately 60 per cent of the net profits for the same period.

Taking the two years 1926 and 1927, combined, the sales of the Western Electric manufactures constituted approximately 16 per cent of the total, while the net profits derived from Western Electric sales constituted 75 per cent of the total profits for the two years, 1926 and 1927. For the year 1926, the sales of Western Electric manufactures constituted approximately 16 per cent of sales, while the Western Electric manufactures contributed 98 per cent of the net profits.

Exhibit X-74 is a copy of the stock certificate of the Graybar Electric Company, and was furnished by the plaintiff. There were 60,000 shares of stock of the character described in Exhibit X-74 received by the Western Electric Company at the time of its sales to the Graybar Management Corporation.

(Defendants' Exhibit X-74-A, entitled "Agreement between Electric Research Products, Inc., and the Graybar Management Corporation and Graybar Electric Company, Inc., dated November 5, 1928," covering changes in capital structure and sale of common stock, offered and received in evidence.)

On the back of this stock certificate identified as Exhibit X-74, appears an agreement by which the Western Electric Company is entitled to participate in the earnings of the Graybar Electric Company, beginning with 1929, in the proportion of 1 per cent of the net earnings as defined in the agreement for each 1,000 shares of stock held by the Western Electric Company.

In other words, in 1929, the Western Electric Company would get in addition to its 7 per cent preferred stock dividend, 60 per cent of the net earnings of the Graybar Company, over and above that, provided there were no retirements during the year.

[fol. 7317] Exhibit X-75, entitled "Graybar Electric Company, Inc.—Additional Dividends on Preferred Stock received by Subsidiaries of the Western Electric Company for the years 1929 through 1931," shows that in the year 1929, the Western Electric Company received from the earnings of the Graybar Company, $1,105,000; in the year 1930, $318,895. And subject to correction, in the year 1931, $11,367, a total for the three-year period of $1,412,528. These earnings are in addition to these $7 per share on the preferred stock.

Exhibit X-75-A, entitled "Western Electric—Sales to Graybar Electric Company," was furnished by the Western Electric Company through Mr. Bracelen to us, and shows sales by the Western Electric to the Graybar Company during the years 1929, 1930 and 1931.

"Mr. Goldstein: At this point I would like to read into the record the correspondence that has transpired between Mr. Bracelen and myself with reference to the sales of the Graybar Company, the refusal to divulge certain information.

Mr. Thompson: Just what is the purpose of this?

Mr. Goldstein: The purpose of this is to show that the Western Electric Company has refused to furnish us a statement showing the sales of Western Electric manufactures by the Graybar Company, 1929, 1930 and 1931. We want the record to show the refusal——

Mr. Thompson: Of course——

Mr. Goldstein: —by Mr. Bracelen.

Mr. Thompson: —the Western Electric Company does not own Graybar.

Mr. Goldstein: No, but under this agreement——

Mr. Thompson: And he is just——

Mr. Goldstein (Continuing): —but under this agreement, the Graybar Company employees have the option to turn back the stock and get their money back, even in case of bankruptcy, and the Western Electric Company has the right to take back the stock; and it is just, in our opinion, a sham.

Judge Wilkerson: What is the evidence? You say you called upon some one, you called upon Mr. Bracelen to furnish——

Mr. Goldstein: Yes, and I just wanted to show that we [fol. 7318] called on Mr. Bracelen—on the plaintiff, to make available for inspection the total sales of the Graybar Company, grouped by the following classes: Sales by the Western Electric to Graybar in 1929, 1930 and 1931, divided into special commercial products; Western Electric manufactures, telephone appliances, lead-covered cable and supplies; and also to make available for inspection the profit and loss statement of Graybar, and the statement showing how the additional dividend shown in Exhibit X-75, the refund, was arrived at in each year; to which we have a reply from Mr. Bracelen:

'In view of the fact that the Western Electric Company has not owned the Graybar Electric Company during the period inquired about, I decline to furnish the information requested under sub-division D and E'—those being our requests,

'—in your letter; except that you have already been supplied with full information as to how the additional dividend from the Graybar Electric Company to the Western Electric Company was arrived at during this period.'

I want to introduce that letter in evidence.

Judge Wilkerson: You may put in the correspondence, but I think the observation should be made that the process of this court is open to you, if you want any evidence produced, under subpoena.

Mr. Goldstein: Yes.

Mr. Thompson: Well, now——

Judge Wilkerson: I do not know that we will get very far in this, by putting in correspondence of that kind.

Mr. Goldstein: All right.

Judge Wilkerson (continuing): Because if you are going to make any point on the decision of the court here about it, it is your duty to subpoena your witness.

Mr. Goldstein: No, we are just going to make the point that they have not made a full disclosure.

Judge Wilkerson: But that does not make any progress with the court.

Mr. Goldstein: All right.

Judge Wilkerson: If you want any evidence produced, you may apply to the court for a subpoena, and the court will give you a subpoena, and will bring the witness in here, [fol. 7319] and if it is material, we will get the evidence in the record.

Mr. Goldstein: All right.

Judge Wilkerson: And we will not have this case go off on some correspondence between lawyers about making certain documents available for inspection. Now, this case is not going off on that.

Mr. Goldstein: Well, then, we will ask——

Judge Wilkerson: Well, make your application——

Mr. Goldstein: —that they produce it.

Judge Wilkerson: —in the proper way.

Mr. Goldstein: All right.

Judge Wilkerson: And you will get your subpœna.

Mr. Goldstein: All right.

Mr. Thompson: Your Honor, I do not want to interrupt, except to say that Mr. Goldstein has read one paragraph of this letter. He failed to read a paragraph in which he said that we would furnish to him——

Mr. Goldstein: And you did furnish it.

Mr. Thompson: Yes, and we did furnish to him——

Mr. Goldstein: Yes.

Mr. Thompson: Note!—'The sales of Western Electric to Graybar in 1929, 1930 and 1931 divided into the following classifications: Telephone apparatus including special commercial products, lead-covered cable and supplies.'

And I would like to explain—if these letters are to go in, I want to explain that Graybar does not keep its sales in the classifications that Mr. Goldstein has asked for, and he has also asked us to furnish a profit and loss statement for three years of the company which we do not own or control.

Mr. Goldstein: But which you——

Judge Wilkerson: The point I am making is this——

Mr. Goldstein: Pardon me.

Judge Wilkerson (continuing): —that when this record is closed, the trial has lasted too long, and there has been too much time taken up here, to have this case go off on a question of the refusal to make available certain things for inspection. That is not the way to get at it.

Now, I am giving you timely notice of that fact.

Mr. Goldstein: All right.

Mr. Thompson: And I make the suggestion——

Judge Wilkerson (continuing): And if you expect to in-
[fol. 7320] vite the decision of the court on any matter of that kind, I say if you expect to ask for a dismissal of this bill on any such ground as that——

Mr. Goldstein: No——

Judge Wilkerson: ——you will have to go at it in a different way.

Mr. Goldstein: Certainly.

Mr. Thompson: I say that the statement made on the record is not a fair statement of the facts as they really exist.

Judge Wilkerson: Well——

Mr. Goldstein: We will put in the correspondence, which will show the facts.

Judge Wilkerson: I do not know what use the defendants intend to make of it, but if it is intended—if this use is intended to be made of it, namely, that the court will not proceed to a decree here because of the refusal of counsel for complainant to furnish or make available for inspection certain documents, I am inclined to think that the view of the court will be that timely notice having been given to counsel to fortify their record in an appropriate way, namely, by subpœna addressed to the witness, and during the attendance of the witness in open court, an offer to prove under the Equity Rule, in accordance with the Equity Rule; and the ruling of the court then, after those matters are before the court, will be made. But you cannot just simply have correspondence in here, and then when we get to the end of the record, say, 'Oh, well, you cannot decide this case because they did not make certain things available to us for inspection,' or if the decree might be for the plaintiff, say, 'It might be reversed because they did not make certain things available to us for inspection.'

Now, I am giving you timely notice of the Equity Rule in this respect, and of the correct procedure.

Mr. Goldstein: We understood——

Mr. Haight: May I suggest, however, that the suggestion of the court of course will not bar the defendants from taking the position that the things that we may have asked for, that point out the existence of materials helpful in making a determination here, may be called to the attention of the

court as constituting deficiencies in the plaintiff's case; [fol. 7321] certainly, that is always open to us in any case where we ask for things and do not get them.

Judge Wilkerson: Oh, if they have omitted to prove something——

Mr. Goldstein: Yes.

Judge Wilkerson: —that is essential in this case——

Mr. Goldstein: That is our position.

Judge Wilkerson: —of course, they have failed, that is all.

Mr. Thompson: We do not need any letters, to make that point.

Judge Wilkerson: I think we understand each other.

Mr. Bracelen: I wish to make on observation on the record. We do not attach much importance to the accusations by Mr. Goldstein that things are sham. He said a moment ago that his position is that this arrangement by which the Graybar was sold, is sham. If he thinks he can show anything of that kind to the court, let him proceed. His gratuitous accusation of that kind does not go very far.

Mr. Goldstein: No, but if you will read——

Mr. Bracelen (continuing): Towards establishing anything.

Mr. Goldstein: But if you will read Mr. Gregory's testimony, and then view that in the light of a million dollars additional profit, where he said they made no profit on the sale, and if you will look at the testimony as to whether or not this was an absolute sale, in view of this agreement which we were only handed the day before yesterday, which discloses that even in the case of bankruptcy the Western Electric has the return of the money, and that all of the employees could get would be their money plus 6 per cent interest, it throws an entirely different light on the relationship between the Western Electric Company and the Graybar.

Judge Wilkerson: Well, now——

Mr. Thompson: That whole statement is so inaccurate——

Judge Wilkerson: —just where does that lead ultimately——

Mr. Thompson: Yes.

Judge Wilkerson: —in a rate case?

Mr. Goldstein: It just leads to this, that when they made a franchise agreement to the Graybar Company on Novem-

[fol. 7322] ber 1, 1928, which was four days before the sale, and as that agreement calls for the franchise to the Graybar Company, to sell the merchandise of the Western Electric Company, as a distributor upon the basis of the prices which were established between the Western Electric Company and the Graybar, under this sort of an arrangement, it is our contention that this special agreement which is contained on the back of the stock certificate is an agreement for stock participation in earnings and profits, because of the franchise for the use of these patented articles, these commercial agreements, not part of the sale, and that when you look at the profits of the Western Electric Company on the sale of its merchandise, you should not stop at the transfer to the Graybar Company, but you should look at the profits of the Graybar Company on those sales as really being the full profits of the Western Electric Company to the extent that it participates.

Now, that is our position. They have set up barriers, and they have said in this court, 'When you look at the profits of the Western Electric Company, you must stop at the International Western Electric line, you must stop at the Graybar line.'

Why? These are separate things, in theory of law. We say irrespective of that legal barrier, in truth you have made a sale to yourselves, and when you consider profit, and when you consider the propriety of these adjustments, and the allocations, you cannot adjust them on the basis of the Western Electric Company as a separate entity. And, therefore, you should do with the Western Electric Company and its subsidiaries just what you are doing with the Illinois Bell and the Bell System; you have got to use it as one unit, consider it as one unit.

Judge Wilkerson: Now, you say you want something produced from the Graybar.

Mr. Goldstein: We want produced from the Graybar——

Judge Wilkerson: Now, let us see. Who owns the Graybar now?

Mr. Thompson: Its employes.

Mr. Goldstein: But let me——

Judge Wilkerson: We are speaking now of the power to produce.

Mr. Goldstein: The Western Electric——

[fol. 7323] Judge Wilkerson: Who has the power now?

I am assuming now that the books of the Graybar are in the custody of Graybar.

Mr. Goldstein: Yes.

Mr. Thompson: Right.

Judge Wilkerson: Who has the——

Mr. Goldstein: And may I say——

Judge Wilkerson: Who has the power to produce the books?

Mr. Goldstein: May I say this: under the agreement between the Electrical Research Products and the Graybar Management Corporation, Electrical Research Products, and through it, the Western Electric can make audits of the Graybar Company, and the profit-sharing which we have shown in X-75, 60 per cent of profit in 1929 and the 55 per cent in 1930, are based upon profit and loss statements, and all that we ask is to see those statements upon which they arrived at those dollars.

That is what we ask for.

Judge Wilkerson: Now, assuming that you want the court to make an order on somebody to produce the books of the Graybar Company, upon whom would the court make the order?

Mr. Goldstein: We would ask for an order to have the Western Electric or its subsidiaries produce the statements upon which they received—which they received, and upon which they have the profit calculations.

Mr. Thompson: Your Honor, may I just make this one observation? When this case went to the United States Supreme Court there was a showing as to the Western Electric profits on its total business, and the court said that that was not a sufficient showing because the inquiry that was to be made was, what profit it had made on its Bell business.

Now, the Graybar Electric Company has never done one dollar of business with the Bell Associated Companies. It is non-Bell.

Now, what Mr. Goldstein stands here and tells your Honor is that notwithstanding the decision of the Supreme Court, he wants to put all of the Bell and non-Bell into the pot.

Mr. Goldstein: No.

Mr. Thompson: Now——

[fol. 7323-a] Mr. Goldstein: That is not it.

Mr. Thompson (continuing): —He cannot claim for a minute that the Graybar Electric Company has ever done

one dollar of business with the Bell Associated Companies during the term of its existence.

Mr. Goldstein: But we do claim——

Mr. Thompson: Now, he claims that they should all be joined together.

Mr. Goldstein: Oh, no, but we do claim that the Graybar Company purchased from the Western Electric the same kind of merchandise that was purchased from the Bell System—by the Bell System, and that the method of proof of the profit of the Western Electric on the Bell business involves an allocation between the Bell and the non-Bell; and second, that the Graybar Company is purchasing the products which are the result of the inventions which this record now discloses under the license contract, the Bell Companies have paid for in full, and we have a right to trace the profits in all directions, from the use of inventions for which the licensee companies have paid in full—the expense.

Now, that is the theory upon which we want those profits. They cannot say, 'We are going to make use of those inventions which the Bell System has paid for, and been charged for all of the expenses of,' and then say, 'You have no right to look at the profits.'

That is our position.

Mr. Thompson: Understand, your Honor, that during the entire time that the Western Electric owned the Graybar, Mr. Goldstein has been furnished with those profit and loss statements. He will not deny that.

Mr. Goldstein: No, but we claim that we are just as much entitled to the profits for the years 1928, 1929, 1930 and 1931, when there was this technical sale, because of the fact that the rest of the——

Mr. Thompson: Oh, you have 1928, Mr. Goldstein.

Mr. Goldstein: 1929, 1930 and 1931.

Mr. Thompson: Yes.

Mr. Goldstein (continuing): Because of the fact that under the agreement of sale——

Judge Wilkerson: Of course, when you say "technical sale" —why do you say "technical"?

Mr. Goldstein: Well, for this reason——

[fol. 7324] Judge Wilkerson: It was either a sale, or it was not a sale.

Mr. Goldstein: For this reason, that when you have a sale——

Judge Wilkerson: I do not know of any such thing as a technical sale.

Mr. Goldstein: Yes, but when——

Mr. Thompson: It was an absolute sale.

Mr. Goldstein: Yes, but——

Mr. Thompson: The Western has no right to take it back.

Mr. Goldstein: We have introduced the agreement——

Judge Wilkerson: You mean, a colorable sale.

Mr. Goldstein: Well, yes, that is much the better word.

Judge Wilkerson: That is to say, you mean there was a pretense of sale, when in fact, there was no sale, is that what you are attempting to convey?

Mr. Goldstein: Yes. May I explain it——

Mr. Thompson: We will be very glad to meet that issue.

Mr. Goldstein: Yes.

Judge Wilkerson: That there was a pretense of sale——

Mr. Goldstein: No, not a pretense of sale, but it was a sale under a peculiar arrangement whereby the——

Judge Wilkerson: I may be a little dense on it——

Mr. Goldstein: All right. Here are the facts.

Judge Wilkerson: —but I do not follow you.

Mr. Goldstein: Here is the picture: In 1928, on November 1st, the Western Electric Company through the Electrical Research Products owns all of the stock of the Graybar Company.

Judge Wilkerson: Let us suspend for just a moment.

Mr. Goldstein: Yes, sir.

Judge Wilkerson: We will resume this discussion after the clerk calls the motions.

Mr. Goldstein: Yes, your Honor.

(Following a short intermission, the proceedings were resumed as follows:)

Judge Wilkerson: You may proceed.

Mr. Thompson: Your Honor, I would like to make a short statement about this Graybar situation; there has been so much said about it that I am——

Judge Wilkerson: You want to say some more?

Mr. Thompson: I want to say some more about it, and [fol. 7325] say something that I think will be helpful, and say something that will be I think accurate and to the point.

The Western Electric Company had a supply department which dealt in goods of its own manufacture sold to non-Bell

customers, and in electrical appliances generally. It desired to segregate that business from the business which it was doing with its Bell customers, so that at the end of 1925 it organized the Graybar Electric Company, and turned over all of the business done by the Supply Department of the Western Electric Company, except something in the foreign field.

That company was operated as a wholly-owned subsidiary of the Western Electric Company for the years 1926, 1927 and 1928. During that period of time it is interesting to note from the exhibit that these gentlemen have put into evidence, the sales of the Western Electric manufactures were a very small portion of the total sales of Graybar, although the profits on those manufactures were relatively larger than the profits made by Graybar on the general supply business in which it was engaged.

For instance, in 1928, which was the last year in which the Company was run as a Western Electric controlled subsidiary, it sold $62,000,000 worth of general electric supplies, and less than $10,000,000 of Western Electric manufactures.

Now, that was the situation when the Graybar Management Corporation was organized. It was organized, your Honor, because the management of the Western Electric Company wanted to dispose of this business, absolutely. It preferred if it could to dispose of it to employees of the Graybar Electric Company, who had been employees of the Bell System before the Graybar was organized. It was an absolute sale; there were certain conditions attached to it, and there ought to be no difficulty in ascertaining what those conditions are, and there has never been the slightest concealment about the conditions.

Mr. Gregory said here when he testified before that there was participation by the Western Electric Company in Graybar's profits.

Now, here is just an instance, and here is what it makes out of it, your Honor, and this is all it makes. First, its profits out of its sales of Western Electric manufactures to [fol. 7326] Graybar; then it has a participating preferred stock. Originally, it owned $6,000,000 of that stock, and now it owns $4,000,000.

This witness has said that it gets 60 per cent of net earnings. That is true, but he failed to define what net earnings

are, and they are defined in the contract. Net earnings are after all taxes, payments for Pension Fund and cumulative dividends upon preferred stock, in the sum of $450,000 a year.

Now, here is just one further fact in connection with that, and then I think Your Honor will have this entire picture. Up to the end of 1933, until the end of 1933, the employees of Graybar had the right to require the Western Electric to take their stock back. After that they had no right to require the Western to take it back, and the Western has no option ever to get it back on its own motion.

Now, that is the exact situation. Now, in view of that situation, what is counsel entitled to? He is entitled to know, as I see it, exactly what he has already gotten, your Honor. He has gotten the sales by the Western to Graybar since the Western Electric ceased to own or control Graybar. He has gotten the exact participation in dollars, and his witnesses testified to it, on account of this preferred stock.

Prior to the sale by Graybar, he has had all of the information.

Now, what more can there be in the picture that he is entitled to?

Mr. Goldstein: If the court please, Mr. Thompson forgot to state two facts. One was that when the Western owned all of the stock of the Graybar, there was a commerical agreement, which we will offer as X-76, dated December 31, 1925, which gave Graybar a very limited franchise to sell the products of the Western Electric Company; that as a part of the same transaction by which the Graybar Management Corporation bought the stock, the Western Electric Company made a new franchise agreement with Graybar which we will offer in evidence as X-77.

Mr. Thompson: Both of which we furnished you.

Mr. Goldstein: At my request.

Mr. Thompson: Yes.

Mr. Goldstein: Within a very—within the last few days, as to 76—which shows a very broad license contract for all of the products, all of these commercial products about [fol. 7327] which this lawsuit has a very, very important issue; the tracing of the profits, the credit to the licensees, from the inventions, from the Development & Research, the expenses of which were charged to licensees; and that is the first thing that Mr. Thompson forgot to state to the court.

The second thing is, that Mr. Thompson stated that the Western Electric never had the right, the option, to purchase back the stocks. If by his statement he means the Western Electric, technically, it is correct; but the agreement X-74-A shows the Products, the Electrical Research Products, in Section 5, as—I read, I quote:

'Products is hereby granted an option, to continue in force as long as any of the preferred stock of Graybar is outstanding, to repurchase from Management'—that is the management corporation—'all of the outstanding stock of Graybar at a price determined in the same manner as provided in Section 4.'

So that if Mr. Thompson is trying to shield himself on the ground that the Western Electric does not have the option, but the Electrical Research Products, which is wholly-owned, I say that is not a protection; and as to the fact, as to whether the Electrical Research Products had the option, it is contained in the agreement, which we will leave with the court.

Now, we want to bring this picture to the court, that when you have an unusual transaction, such as in this case, where the Western claims that they made a sale of $9,000,000 of assets for $9,000,000 without profit, and where it appears that as a part of the same transaction they are given the assets—they give the purchaser of the assets a franchise to purchase its products as a distributor, upon preferential treatment as to the costs which are involved in these allocations of the Western Electric between Bell and non-Bell,—and where as a part of a sale you have the purchaser paying not only that $9,000,000, not only the 7 per cent on the unpaid balance of the purchase price, but giving the seller the right to participate to the extent of 60 per cent of the profits, after the taxes and after the dividends, and 55 per cent——

Mr. Thompson: And after the $450,000.

Mr. Goldstein: And after the $450,000; but in 1925,—or in 1929, giving them an additional profit of $1,000,000, and in 1930 an additional profit of $318,000. It is an unusual trans- [fol. 7328] action, as a part of the sale. They have said that it was not, that the sale did not give them that profit.

The only other reason then for that profit is this franchise, which was given as a part of the sale, about which they have said nothing; and it is that franchise which is in-

volved in this litigation, because it involves the sale of these commercial products.

Judge Wilkerson: All this started, I think, from your offer to read certain correspondence.

Mr. Goldstein: Yes.

Judge Wilkerson: It is in the record.

Mr. Goldstein: Right.

Judge Wilkerson: I have suggested——

Mr. Goldstein: We are satisfied.

Judge Wilkerson: I have suggested to you that where a company is involved, where documents are in the custody of its officers, and that company is before the court, if you want anything produced from the records of that company, then you should get out a subpœna.

Mr. Goldstein: But I have a perfect right—we have a right to have the record show it, as bearing upon their proof, that is all.

Judge Wilkerson: If it is a part of their proof——

Mr. Goldstein: We say it is, and we just want to show the absence of it——

Judge Wilkerson: If it is an essential part of their proof——

Mr. Goldstein: Right.

Judge Wilkerson: And it is something that they are bound to show——

Mr. Goldstein: That is right, and we claim it is.

Judge Wilkerson (continuing): If it is something that, under the 'Peculiar Knowledge' rule——

Mr. Goldstein: Right.

Judge Wilkerson: —it is their duty to show, and they fail to show it, then you are entitled to all of the instances——

Mr. Goldstein: Yes.

Judge Wilkerson: —which flow from that failure to show.

Mr. Goldstein: We want to show we made an attempt to get it, and it was refused us, and that is all.

Judge Wilkerson: You have asked for it.

Mr. Goldstein: Yes.

[fol. 7329] Judge Wilkerson: You have told them you want it.

Mr. Goldstein: Yes.

Judge Wilkerson: And you think that they should give it to you.

And further than that, you say 'Well, we will argue the inferences from that, when we come to argue the case.'

Mr. Goldstein: That is correct.

Mr. Haight: And further, we are telling them, we think it is a part of their case, and to that extent we are trying to aid them.

Judge Wilkerson: You are warning them.

Mr. Thompson: It is very kind, I am sure.

Mr. Haight: And if they will not accept the warning——

Judge Wilkerson: You are warning the plaintiff——

Mr. Haight: Yes.

Judge Wilkerson: —that you will insist, in your argument——

Mr. Haight: Absolutely.

Judge Wilkerson: —that that is an essential part of their case.

Mr. Haight: Yes.

Mr. Goldstein: Right.

Mr. Haight: And if they think that our suggestion of aid is worthless, why, they are taking the chance, if we happen to be right.

Judge Wilkerson: All right. You may go ahead."

(Statement by Mr. Goldstein:

"Exhibit X-76 is entitled 'Commercial Agreement between Western Electric Company, Inc., and Graybar Electric Company, Inc., dated December 31, 1925.'

Exhibit X-77 is entitled 'Distributor Contract between Western Electric Company, Inc., and Graybar Electric Company, Inc., dated October 11, 1928, effective November 21, 1928.'

Exhibit X-74-A is Electrical Research Products, Inc., and Graybar Management Corporation, and Graybar Electric Company, Inc., agreement covering changes in capital structure and sale of common stock of Graybar Electric Company, Inc., dated November 5, 1928.

Exhibit X-78, entitled 'Correspondence between Graybar Electric and Western Electric Company' consists of a letter [fol. 7330] dated January 21, 1926, from the Comptroller of the Western Electric Company to F. A. Ketcham, Executive Vice-President, Graybar Electric Company, Inc.; letter dated February 10, 1926, from Mr. L. M. Dunn, Executive Vice-President Graybar Electric Company, to R. H. Gregory, Comptroller, Western Electric Company, Inc.; letter dated January 18, 1927, from R. H. Gregory to F. A. Ketcham, Executive Vice-President, Graybar Electric Com-

pany; and letter dated March 4, 1927, from F. A. Ketcham, Executive Vice-President, Graybar Electric Company, to R. H. Gregory, Comptroller.

The above letters, Exhibit X-78, were furnished by the plaintiff, and state the arrangements between the Western Electric Company and the Graybar, regarding compensation to the Western Electric for services rendered during the years covered by these letters.")

The Witness (continuing): Exhibit X-79, entitled "Western Electric—Profits from operations of Electrical Research Products, Inc., and percentage of Return on Western Electric Company, Inc., investment" shows the profit from operations of Electrical Research Products, Inc., and the percentage of return to the Western Electric on its investment. The figures were taken from the reports furnished, which have been previously identified as D-74 and D-75. X-79 shows the total net profits of the Electrical Research Products as shown by the reports, line 1 of Exhibit X-79.

The line "Profits from Operations" shows net profits after deducting earnings on outside investments and marketable securities, and adding undistributed earnings of foreign subsidiaries.

This exhibit shows that on the average investment of Western Electric in Electrical Research Products, Inc., and excluding the investment in marketable securities, the return was in the year 1927, 93.3 per cent; in 1928, 121.8 per cent; in 1929, 309.4 per cent; and in 1930, 119.4 per cent.

Giving effect to the earnings not declared as dividends, and considering the undistributed earnings, such undistributed earnings as part of the Western Electric investment, the return on that basis was in the year 1927, 63.6 per cent; in 1928, 51 per cent; in 1929, 68.1 per cent; and in the year 1930, 18.2 per cent.

In Exhibit X-79 the difference between the two sets of [fol. 7331] returns, that is the return on the one which is shown on the line which shows 93.3 per cent in 1927, and 121.8 per cent in 1928, and 309.4 per cent in 1929, and 119.4 per cent—that is Western Electric Company investment in Electrical Research Products, not taking into account the undistributed earnings as part of the investment. Then by giving effect to the undistributed earnings as a part of

the investment, I show in the last column, in the last line, 63.6 per cent return, 51 per cent, 68.1 per cent, and 18.2 per cent.

Exhibit X-80, entitled "ERPI—Copy of Journal Entry No. 150, dated June 30, 1927," consists of two sheets, and was compiled from data furnished to us by the Western Electric Company, and explains the entries in connection with the transaction referred to in Exhibit D-82.

This exhibit shows that on June 30, 1927, a reserve of $1,000,000 was set up, and that on October 31, 1930, the reserve was credited to "Sundry Income," but reversed on the same date. The exhibit shows the journal entries and cash book entries relating to the $4,000,000 transaction referred to in Exhibit D-82. Of this $4,000,000 the reserve of $1,000,000 is still on the books of Electrical Research Products, and to that extent the profits of Electrical Research Products as shown in X-79, are understated.

Exhibit X-81 is entitled "Western Electric Co., Inc.—Return on Investment in Northern Electric Company, Limited" shows the return on investment of the Western Electric in the Northern Electric Company, which are applicable to the Western Electric investment.

Exhibit X-82, entitled "Western Electric Company, Inc. —Percentage of Return on Average Capital Stock and Surplus Allocated to Bell and non-Bell average investment based on a 10 per cent return on the average investment in Bell and non-Bell assets" is described as follows:

The first column headed "Average Investment per Plaintiff's Exhibits A-77 and A-79," is taken from those exhibits and shows the combined figure.

Column 2 shows the amount of earnings available for return on the basis of 10 per cent on the return on investment previously described.

Column 3 shows the total amount of capital stock allocated to the Bell and non-Bell business.

[fol. 7332] Column 4 shows the per cent return on average capital stock allocated to Bell and non-Bell business.

Column 5 shows the average capital stock and surplus allocated to Bell and non-Bell business. This column differs from the column "Average Capital Stock allocated to Bell and non-Bell business," by the inclusion of surplus, which is omitted from the former column.

The last column shows the percentage of return.

Exhibit X-83, entitled "Western Electric, Inc., and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return," shows the return on investment to the Western Electric Company from its operating earnings and from its non-operating earnings on a consolidated basis, using the Company's figures for net profits and for investment.

Exhibit X-83-A, entitled "Western Electric and Subsidiaries—Computation of Average Investment, per Touche, Niven & Company," shows the basis of arriving at the average consolidated investment before and after depreciation.

Exhibit X-83-B, entitled "Western Electric and Subsidiaries—Reconciliation of Consolidated Net Profits per company with Consolidated Profits as Adjusted," shows the adjustments that I made to consolidated net profits. Those adjustments of rate base and net profits are as shown in X-84.

Exhibit X-84, entitled "Western Electric and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return," gives effect to the adjustments which I have made. The adjustments in X-83-A and X-83-B are of similar character to those I have described in X-49 and X-50, except as indicated, and except so far as they may involve similar adjustment on subsidiary companies, and therefore need no further description.

Exhibit X-84 is before depreciation, and X-85 is entitled "Western Electric and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return." X-85 is identical with X-84, except that there is a depreciation reserve deducted.

Exhibit X-86, entitled "Western Electric and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return," gives effect to profits as adjusted on the Company's rate base.

[fol. 7333] The profit on the sale of the International Western Electric Company was included to a certain extent in the consolidated profits computed by Mr. Gregory. I have, in Exhibit X-86, added back the portion of International Profits which he allocated, which he did not take up in his consolidated net profit. I am not certain whether that is the portion which was allocated by him to the period prior to 1918. It represents $1,989,000. Then I took up the profit on the sale of the property to the Bell Telephone

laboratories, of $2,113,000. This is the only exhibit in which I reflect that profit. Then I took up the net profit of $457,000 on the sale of the Graybar stock. It represents the difference between the profit of $2,300,000 made on the sale, minus the amount of profit which Mr. Gregory already had included in the consolidated net profits of the Company.

Exhibit X-87, entitled "Western Electric and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return" gives effect to the average investment as adjusted before depreciation, shown in Exhibit X-83. The column, "Profits as Adjusted," is in conformity with Exhibit X-83-B. The last column shows the percentage of return.

Exhibit X-88, entitled "Western Electric and Subsidiaries—Consolidated Average Investment, Profits and Percentage of Return," is similar to Exhibit X-87 except that it gives effect to the added factor of reserve for depreciation which is deducted in Exhibit X-88. That is, it shows the effect of the net profits as I adjust them in the manner I stated before on the rate base as I adjusted it, after deducting depreciation reserve.

Exhibit X-88, for the period from 1923 to 1930, shows the following return on investment: 1923, 6 per cent; 1924, 11.3 per cent; 1925, 20.9 per cent; 1926, 14.7 per cent; 1927, 18.5 per cent; 1928, 21 per cent; 1929, 19.1 per cent, and 1930, 8.2 per cent.

Exhibit X-89, entitled "Western Electric—Basis of Published Figures of Companies included in Plaintiff's Exhibit A-85 (taken from Poor's Manual)" shows that of the 88 companies included by Mr. Gregory in his Exhibit A-85, practically all of them show, in Poor's, the earnings and assets on a consolidated basis, which includes the parent company as well as the entire operations of the subsidiary companies.

Exhibits A-77 and A-79 include only that portion of total [fol. 7334] investment and total earnings of the Western Electric Company itself, that Mr. Gregory allocated to operations, and do not include either the non-operating assets, or the non-operating earnings of the Western Electric Company, nor any of the earnings from investments or from profits in the subsidiary companies of the Western Electric Company.

Column 2, Exhibit X-89, shows the companies whose earnings are on a company basis of operating and non-operating income, and operating and non-operating assets, but not including subsidiary companies.

Exhibit X-90, entitled, "Western Electric—Comparison of Earnings and Rate of Return Computed on Basis Shown in Exhibit A-85, with that shown in Exhibits A-77 and A-79," shows a comparison between the return on investment on the basis of earnings and investment figures as taken from Poor's Manual, for the Western Electric Company.

Exhibit X-91, entitled, "Western Electric Company—Percentage of Return on—'Average net investment' (exclusive of bonded indebtedness) to 'Earnings Available for Dividends,' " taken from Poor's Manual, shows return on capital. It shows the return on capital and surplus based on non-operating assets and non-operating earnings of the Western Electric Company alone without taking into account any of the subsidiary companies for each of the years from 1915 to 1930, as taken from Poor's Manual without any adjustments of income.

Exhibit X-92, entitled, "Depreciation Policy of Companies, from Poor's 1931 Manual," is taken verbatim from Poor's—the depreciation policy, for the 88 companies. It is merely a compilation. It speaks for itself.

Exhibit X-93, entitled, "Western Electric—Plaintiff's Exhibit A-85—Depreciation Rates," is a grouping of the depreciation rates used by the various companies on machinery, furniture, buildings and small tools, indicating those companies, whose rates are in conformity with those approved by the Internal Revenue Department, taken from Poor's.

Exhibit X-94, entitled, "Western Electric—Adjustment to Surplus Accounts Omitted in Computation of Average Annual Earnings of Various Companies, included in Plaintiff's Exhibit A-85 (Debit Adjustments are shown in black; [fol. 7335] credit adjustments in red) surplus adjustments of 88 companies, 1931" is a compilation showing the kinds of adjustments to surplus made by 88 companies, of the same character that Mr. Gregory used in connection with his Exhibits A-77 and A-79 as charges to operating earnings. I have found from my examination of each of the 88 companies, in Poor's, additional facts which should be

taken into account in any comparison between the Western Electric Company and the 88 companies.

From an examination of some of the companies included among the 88 companies included in Exhibit A-85, I find that seven of the companies carried their inventories at cost. Those companies are: DuPont, Mathiesan Alkali Works; for the years 1926 and subsequent, the Consolidated Cigar Corporation and the Continental Baking Corporation; for the years 1927 to 1930, Ligget & Meyers Tobacco Company, and the Lorillard Company; prior to 1930, the Goodrich Tire & Rubber Company carried its finished and semi-finished products at cost.

I also found that three of the companies had employes' profit-sharing plans. The Dennison Manufacturing Company has management and employes stock, as extra compensation, but does not have a pension fund.

The Endicott-Johnson Corporation has a profit-sharing plan for employes. The National Cash Register Company employes receive the profit-sharing at varying percentages of the earnings after taxes, which was discontinued in 1926, at which time the employes received 37.5 per cent of the common B stock in lieu of the profit-sharing arrangement.

From my examination of the working papers underlying Mr. Gregory's Exhibit A-85, I did not find that any effect was given to this profit-sharing as deductions from operating earnings. I also found that several of the companies were engaged in businesses that are rather far removed from the business of the Western Electric Company. The Columbia Carbon Company owns gas wells, oil wells and pipe lines. There were six companies that owned mines, the Allied Chemical & Dye Corporation, the Glidden Company, the Goodyear Tire & Rubber Company, The International Cement Company, The International Harvester Company and the National Lead Company.

[fol. 7336] Three companies owned phosphate, sodium and/or limestone deposits, the American Agricultural & Chemical Company, the American Cyanamid Company, and Mathieson Alkali Works.

Three companies own timber lands, the Deere Company, the Diamond Match Company, and the International Harvester Company. Two companies have rubber plantations, the Goodyear Tire & Rubber Company and the B. F. Goodrich Tire & Rubber Company.

This list is not intended to be all inclusive, but is simply a sampling of some of the companies included among the 88. The effect of engaging in mining, in oil, and also in timber operations, would involve the question of depletion of return and reduction of investment in those particular assets.

Exhibit X-95, entitled, "Western Electric—Comparison of per cent of return on investment and per cent of net profit to sales of companies shown in Plaintiff's Exhibits A-85, A-86 and A-87," shows a comparison of percentage of average earnings to average investment, with percentage of net profits to sales on representative companies of the 88 companies. It shows that there is no relation between the two percentages.

Exhibit X-96, entitled, "Western Electric Company, Inc. —Ratio of sales to average investment for year 1927 (compiled from Poor's Manual)," compares the ratio of sales to average investments of the Western Electric Company for Bell and non-Bell business, and also for Bell and non-Bell combined, showing the ratio of sales to the average investment—with ratio of sales to average investment of those of the 88 companies included in Exhibit A-85, which showed a large percentage, net profits to sales. This exhibit shows that the percentage of net profits to sales has a relation to the rate of turnover, and that the larger the turnover, the less percentage of profit to sales, appears.

Exhibit X-97, entitled, "Western Electric Company, Inc. —Results obtained by apportioning combined plant of two companies (selected from Plaintiff's Exhibit A-85) on basis of the combined sales for the year 1930," shows the effect of apportioning plant on the basis of cost of sales where fast and slow moving items are combined. It shows that an ap- [fol. 7337] portionment made of plant on basis of cost of sales will not be in accordance with the use, which is the basis used in Mr. Gregory's exhibits. Cost of sales will not give you the use of a plant, for the simple reason it involves the question of inventories. In other words, it brings in the question of goods manufactured in the prior year, for sale in subsequent year.

As an illustration you might take an extreme case, goods manufactured in the year 1927 and sold in the year 1928, and we will assume that the goods manufactured in 1927 were of a type that was discontinued at the close of the year 1927, but that the merchandise itself was sold in the year 1928. If you use the apportionment in the manner in which

Mr. Gregory has used it, you would be apportioning to those sales in 1928, part of the 1928 plant, which would in no way be related to the plant used in the year 1927; that is, the year in which the goods were manufactured.

Exhibit X-98, entitled, "Western Electric—Collections from Bell Companies—(WE Schedule Reference CM-714)," shows the collections by the Western Electric Company from the Bell Companies, in Column 1, and Column 2 shows the cash taken by the licensee companies from the American Telephone & Telegraph Company, as shown in reports CR-13. The last column shows the ratio of one to the other.

Exhibit X-99, entitled, "A. T. & T. Co.—Investment in Western Electric Co. Common Stock (New York Corporation)," shows the investment by American Telephone & Telegraph Company in the common stock of the Western Electric, and was prepared from data furnished by American Telephone & Telegraph Company.

Exhibit X-100, entitled, "A. T. & T. Co.—Monthly High, Low and Average price of the common stock (per New York Stock Exchange quotations), 1920-31."

Exhibit X-101, entitled, "Illinois Bell Telephone Company—Sales of Illinois Bell Telephone Company's First and Refunding 5% Bonds—Series A—1956 (New York Stock Exchange) (Taken from 'The Analyst')," shows the year's sales, or resales of the Illinois Bell Telephone Company 1st and Refunding 5 per cent Bonds, Series A, 1956, on the New York Stock Exchange, as taken from the Analyst.

[fol. 7338] I requested of the Western Electric Company and was furnished Defendants' Exhibit X-102, entitled, "Analysis of profits on business other than the Bell Telephone Companies from 1881 to 1927, inclusive." I requested from the Western Electric Company the underlying data supporting Exhibit X-102.

In answer to that request, I was advised by the Western Electric Company that the underlying papers—the working papers underlying the Exhibit D-61 of which this shows the detail by years, would be furnished in Chicago, and then subject to the approval of counsel.

Cross-examination.

By Mr. Thompson:

I said in my direct examination that there were three companies included in the list of 88 companies that had profit-sharing arrangements with their employes. I am

familiar with the practice of only one of the companies, as to whether the profits which were shared with the employes were deducted from the profits as shown in their reports, included in Poor's and Moody's Manuals. In that company, the profits paid to employes were deducted as an operating expense, with the result that its profits were understated to that extent, in Poor's and Moody's Manuals. I do not think that the comparison shows the earnings of these three companies as lower than they actually were.

In the case of the Endicott-Johnson Company, I am under the impression that Mr. Gregory excluded that profit-sharing arrangement. This profit-sharing affects the comparison between the Western Electric Company and these 88 companies, in that in most cases the profit-sharing arrangement is in lieu of a pension fund. In the case of the Western Electric Company, the pension fund is deducted as an operating expense, and in other cases of profit-sharing arrangements, it is a form of profit-sharing which does not enter into normal operations. It affects the statement of earnings of one of the companies, Endicott-Johnson, as shown in the exhibit including the 88 companies. That means that if they have taken part of their earnings out before they reported them to Poor or Moody, their earnings are lower than they would have been if they had left it in, but I wish to point out that in Exhibit A-85, effect has been given to that factor. I think there is a point to it.

[fol. 7339] Whether in Exhibit X-79 an attempt is made to show the earnings made by the Western Electric Company on its investment in Electrical Research Products depends upon what you mean by "earnings on its investment." By the statement "Profits from operations of Electrical Research Products and percentage of return on Western Electric Company investment," I mean that it shows the percentage of return, using as the basis, the profit from the operations of the Electrical Research Products, as compared with the original dollar investment of the Western Electric Company. In 1927, the line which says "Average investment of Western Electric Company," $2,299,000, is not the dollar investment of the Western Electric Company in Electrical Research Products capital stock for 1927. It excludes the investments and marketable securities; it represents the cash and accounts receivable that were turned over by the Western Electric Company to the Electrical Research Products, in lieu of capital stock. It is excluding

investments and marketable securities which were turned over at the same date. I say, as a result of this exhibit, that the Western Electric Company earned in the year 1929, 309.4 per cent on the average investment of the Western Electric Company in Electrical Research Products, excluding investments and marketable securities of Electrical Research Products. In arriving at that figure I have included undistributed earnings of foreign subsidiaries for that year in the sum of $2,130,000. The investment of Electrical Research Products in those foreign subsidiaries does not enter into the calculation.

"Q. No, it does not enter into the calculation at all. Of course, if the Electrical Research Products had large investments in its foreign subsidiaries, and you bring in the profit, and you do not bring in the investment, it is not hard to get a figure of 309, is it?

A. But I am calculating the return to the Western Electric Company. The Western Electric Company had an investment of $2,250,000 in Electrical Research Products.

Q. Well, does not this 309.4 per cent attempt to show that there was that large earning by the Western Electric Company on the basis that you think is the fair and proper basis to set up in an exhibit, or is this just a calculation?

[fol. 7340] A. This is an attempt to show what the earnings actually were."

I stand back of this figure of 309 per cent as the earnings of the Western Electric Company on its investment in Electrical Research Products. I showed $2,130,000 of earnings made by Electrical Research Products from its foreign subsidiaries, without reflecting or giving any effect whatever to the investment of Electrical Research Products in its foreign subsidiaries because the subsidiaries are owned wholly by Electrical Research Products. Electrical Research Products has money invested in them. As an accountant I do this because I am calculating the return of Electrical Research Products and subsidiaries, the return of the Western Electric Company, and all of the money that the Western Electric Company has invested in the entire Electrical Research Products organization, was $2,250,000.

In my opinion as an accountant, that is a proper basis upon which to make a calculation on which to determine earnings. There may have been an internal profit on Electrical Research Products sales to its subsidiaries, on inven-

tories which were not disposed of during this period of time. That was not excluded from their profits because I had no basis of arriving at it.

"Q. Well, you are setting this up to show what the profits were. Did you make any inquiry to ascertain whether that was a fact, and if it was a fact, how it would affect this calculation?

A. I used the best available information that I could get.

Q. Well, this is an affirmative piece of work that you have done, which results in showing perfectly tremendous profits made by the Western Electric Company here. Did you not want to know whether this was a correct calculation or not?

A. Well, I am restricted in any calculation that I may make, by the data which is made available to me.

Q. Did you inquire about that?

A. I did not inquire about the profits which may have been—which might have been in unsold merchandise,—but I feel that such an effect would not be very material, because if it is taken out of one year, it would be reflected in another year.

[fol. 7341] Q. Well, how do you know how it can affect one of the years, if you do not know what it is? If you have no idea as to the amount, how can you say it is not material?

A. Well, the question of inventories only affects one specific year. Eventually profit is to be picked up, whether it is to be picked up in one year, or picked up in another year.

Q. No, but this is consolidated—you are trying here to find out, not the difference between an inventory of one company, and the same company in another year, but where there are subsidiaries, where there is an inter-company profit?

A. Well, the only inter-company profit would exist between Electrical Research Products and its subsidiaries."

I do not know whether it is a fact that Electrical Research Products was largely financed by means of loans made by the Western Electric Company, to Electric Research Products, rather than by stock issued by Electrical Research Products itself, or by a bond issue. I never studied that phase of the situation. I do not think that it was important, when I was trying to find out what the return to the Western Electric Company was, to ascertain the method of financing of Electrical Research Products. If I had found out that there were large loans made con-

tinuously by the Western Electric to Electrical Research Products, so that it was really financed through loans, I do not know that I would have changed the exhibit so as to include those loans as a real part of the Western Electric's investment, nor found out the return not only on these small figures that I have put in here, but on the larger figures including the loans.

I do not know what I would have done if I had found that out. I cannot answer a question like that without giving it some thought.

"Judge Wilkerson: Suppose we take an extreme case; suppose the company actually had, as its investment, $1,000, as far as its investment was concerned, but as a matter of fact, the entire investment in the business is more than $5,000,000.

Would you in estimating your profit, take the per cent on the $1,000, or the $5,000,000?

The Witness: It depends on who contributed the $5,000,000. If the $5,000,000 was borrowed, if it was borrowed from the banks——

[fol. 7342] Judge Wilkerson: I am assuming that the Western Electric Company contributed it.

The Witness: You can calculate the basis—the return on two bases. You can calculate it on the original investment——

Judge Wilkerson: Well, is there any system of accounting by which it could only be figured on the $1,000?

The Witness: I think there is.

Mr. Thompson:

Q. No, but that is what you have done here, is it not? That is what you have done here deliberately.

A. I have not done it deliberately."

In getting up Exhibit X-79, I had in mind showing the profits from operations of Electrical Research Products, on an operating basis only, excluding the non-operating income.

"Q. Mr. McCann, I notice that on some of the exhibits that were introduced this morning, the legend "Per Touche, Niven & Company." As I understand it, you have done this work, flowing into all of these exhibits, on behalf of the firm of Touche, Niven & Company, is that correct?

A. That is correct.

Q. Now, I want to hand you this Exhibit X-79, and I want you to assume that Electrical Research Products wants to put out a bond issue, and it wants to go to the public with that bond issue, and I represent the bankers, and I come to you with that statement. Will Touche, Niven certify that, as a correct statement of the return on investment, on which bonds are to be sold to the public?

A. Well, to begin with we could not certify it, because I have accepted all of the figures from the company; I have not verified any of these figures.

Q. Oh, no——

Judge Wilkerson: Assuming the accuracy of the figures.

Mr. Thompson: Yes, assuming the accuracy of the figures. Will you certify them to be——

Judge Wilkerson: Assuming the accuracy of the figures, would you certify this method of estimating the per cent of return?

Mr. Thompson: Yes, to the public that is going to put its money into bonds on this property.

The Witness: You cannot answer a question yes or no— [fol. 7343] on a question like that. It involves too many outside elements."

Exhibit X-67 is an attempt to show the return on investment of the Western Electric in the International Western Electric for the years 1918 to 1925. That is just the dollars actually invested; it is not the money left in the business from earnings at all. The second thing is that I have included in here as one of the large factors affecting it in the earnings shown, $15,955,095 of profit on the sale of the International Western Electric Company.

I believe that that company, its affiliates, and its predecessors, conducted a business abroad from about 1882 until 1925. The profit on the sale of that business does not necessarily represent the undistributed earnings in the business from 1881 down to 1925. It represented the profits they made in 1925 when they sold the business.

I say it was all applicable to the period, 1918 to 1925. I offered as a reason for including it all in that period, that there were certain statements in the stockholders' reports of the Western Electric Company that showed first that it had sustained capital losses during the war period abroad, and second, that it had not made any money in this business abroad during the war. I cannot give you the page numbers,

but the statements appear in the annual reports for the years prior to 1920. (Counsel handed witness annual reports for years 1918 and 1919.) The report for the year ending December 31, 1919, and the report for the year ending December 31, 1918, are the reports I saw and referred to in my testimony yesterday. They are the reports I rely on. I do not know whether you have correctly marked the extracts that I rely on. I do not know, because I went through the entire report. I could not state the pages.

Those particular reports are one of the factors that I relied on. I also relied on the contention that the profit is made when the sale is made; that the profit on a sale of a business is not to be allocated over any period of years. I relied on the two taken together.

If the Western Electric Company had an investment in the International Western Electric Company and its predecessor corporations covering the period 1881 down to 1925, and those companies had made substantial earnings from [fol. 7344] 1881 continuously down to December 31, 1917, which had been left in the business and then in 1925, the Western Electric Company sold its stock ownership in the International Western Electric Company, if I were going to figure the return on Western's investment for the period 1918 to 1925, I would include the profit in the year in which the sale was made, no matter what year they were made in.

"Q. Without respect to when the earnings of the Company had been made, whose stock was sold, and resulted in the realization of a profit?

A. You are drawing the inference that the profit——

Q. No, I am drawing no inference. I am asking for your opinion.

A. Well, you have made the statement that the profit on the sale is related to earnings. That may or may not be related to earnings for proper years.

Q. Do you know what the fact is in this case?

A. I know that the Western Electric Company made a profit of $15,000,000, but I do not know why."

In a number of my exhibits, I have apportioned the unexpended balance to the reserve for depreciation between the Bell and non-Bell investment. I did not follow the method which Mr. Gregory used in making this apportionment because to my knowledge there were no working papers available at the time I made my apportionment. I mean that I

made my apportionment before Mr. Gregory introduced Exhibit A-194, which showed an apportionment. I couldn't have followed his method. I used the method which is the only basis which I could see could be used, in the light of the facts I had. I wouldn't say that my method correctly reflects the apportionment of the unexpended balance in the reserve between Bell and non-Bell. All of these methods of allocation are subject to argument. There is no such thing as correct or incorrect. It is a matter of opinion. I wouldn't say that my method was right. It was the only one that I could use, in view of the data which was furnished me by the Western Electric Company.

I would not say that any allocation I made between Bell and non-Bell is the proper method. I merely tried to use some method that would give a result as between Bell and [fol. 7345] non-Bell, without attempting to pass on the propriety of any method that was used by Mr. Gregory, or any method which I might adopt. I prepared this exhibit where I allocated an unexpended balance in the reserve for accrued depreciation between Bell and non-Bell business long before I saw Mr. Gregory's exhibits. I could not have followed any method that he used because he had no apportionment at that time. I was confronted with the necessity of making an apportionment between Bell and non-Bell, and I chose a method of apportioning that on the basis of average plant investment. It is the same thing as the average plant invested as reflected in Mr. Gregory's exhibits.

"Q. Now, you did that because you believed that apportionment made by that method would be substantially and approximately correct? Or didn't you believe that it would be correct?

A. I am not passing on the correctness of the apportionment.

Q. I know; but you introduced an exhibit here, not based on any method used by Gregory, where you chose your own method of apportionment, and I want to know now, whether you say it is right, or whether you repudiate the method you used?

A. I do not repudiate the method, because I used the apportionment of the reserve for depreciation—I used the same apportionment of that reserve as Mr. Gregory used of his plant account. I had no means of telling how much of the amounts of reserve applied to one class of plant, or another class of plant.

Q. And you put up an exhibit in which that is an important part of your work, in making your apportionment of this reserve for accrued depreciation between Bell and non-Bell. I want to know whether you say to the court that the method used in the exhibit will give an approximately accurate result, or whether it gives no result.

A. I can answer it in this way: That in view of the facts that there were at my disposal, it was the only apportionment which I could think of that I could make.

Q. Do you say it gives an approximately accurate and fair result, so that when the court looks at these exhibits where you have attempted to apportion this unextended bal- [fol. 7346] ance in the reserve between the Bell and the non-Bell business, he will get a substantially accurate picture of the amount that you say ought to go against the Bell business. Now, either he can or he cannot. I want to know which.

A. Well, if you attack my apportionment of the reserve, you attack your own apportionment of the plant account.

Q. I am just asking you the question. You have used it now. We didn't use it at all in that connection. I want to know whether you say that by using it, you get an approximately correct answer.

A. I say that it is the best apportionment that I could make, in view of the facts which were at my disposal."

I have presented exhibits prepared by me, in which I am proceeding upon the theory that the average investment of the Western Electric in its Bell and its non-Bell business, should be reduced by the unexpended balance in the reserve for accrued depreciation. In order to do that I have to apportion that unexpended balance between Bell and non-Bell business. I did not have the Western Electric Company exhibit and could not use their apportionment, so I had to make an apportionment of my own. I would say that the basis I had to choose from was rather limited. I had very little information. I had to make it on some basis.

"Q. Do you represent to this court that you have made it on a basis that will give an approximately fair and correct answer, or is it to be disregarded? I want to know, one or the other, without equivocation.

Mr. Goldstein: Mr. Thompson, will you explain whether you mean now as a result of the allocation of depreciation reserve, or the result of the rate of return? Which are you

talking about, you are confusing this witness by the two things. One has nothing to do with the other.

Mr. Thompson: No.

Mr. Goldstein: Let's get the question straight, so there will not be any ambiguity.

Mr. Thompson: There is no confusion, no ambiguity.

Q. You understand, don't you?

A. I don't think I do follow you; I have answered you about four times, and each time you go back to the same question.

[fol. 7347] Q. All right. Now, what do you think I am trying to get at? Don't you know?

A. You have asked me why I used that particular apportionment.

Q. Yes.

A. What I have tried to explain is, it was the only one available, the only available basis that I could use.

Q. Now, let's follow through, and I am only trying to get your view of this Mr. McCann. You set up certain exhibits that you ask the court to take, which are based on the theory that there should be deducted from the average investment in the Bell business, and the average investment in the non-Bell business the unexpended balance in the reserve, is that right? You understand that step now thoroughly?

Mr. Thompson:

Q. Do you understand my question, Mr. McCann? After Mr. Goldstein's statement, you don't understand it now, is that right? You told me a minute ago you did.

Mr. Goldstein: We would like to know what apportionment you are talking about, because that is the vital part of this case, and you are trying to bring two thoughts into one question, and we have a right to know which thought you are talking about.

Mr. Thompson:

Q. Can you understand the question, or can't you?

A. I am afraid I can't, at the present time.

Q. All right. We will pass it. The amount of two million dollars is included——

Judge Wilkerson:

Q. In your opinion, is the basis as stated there, the correct basis?

A. Well, that all depends on the circumstances. I have made a very limited examination of these records, and if I had made the apportionment of plant as well as the apportionment of reserve, I might have adopted an entirely different basis; but Mr. Gregory made the apportionment of plant.

Judge Wilkerson:

Q. The whole point is, what do you expect us to do with the exhibit, what are we to do with it? What do you think it shows to us?

[fol. 7348] A. I think it represents as good an apportionment as I could make, under the facts which were presented to me.

Q. But you are not prepared to say that in your opinion it is correct?

A. That is right."

I did not follow Mr. Gregory's method in apportioning this unexpended balance in the reserves. As I stated before, his apportionment was not made at the time I made mine, but his apportionment was examined by us subsequently, and in my opinion the difference between his apportionment of the reserve and my apportionment is not material to the case, except in so far as it affects the extraordinary depreciation reserve. In other words, I do say that there are differences, but they are not material.

I said I did not follow Mr. Gregory's method, but I believe, in my opinion, that the differences between the two methods are immaterial. I think they are both substantially in agreement, except as far as the extraordinary depreciation reserve is concerned. I would not pass upon the correctness of the method used.

The amount of two million dollars which was included in Mr. Gregory's exhibit as an operating expense on account of depreciation on machinery in the year 1928 first appeared on the books in 1928. A portion of that could have been claimed in an amended income tax return of the Western Electric Company, for the years 1924, 1925, 1926, 1927.

I was furnished with a reconciliation of the books with the income as finally determined with the Income Tax Department, and as shown by amended returns for the later years, and that item appears as one of the items of reconciliation, showing it was not taken up in the Federal Income Tax Return.

I don't know whether the Western Electric has made a claim to the Government on account of this $2,000,000, but I do know that the reconciliation which they furnished me, which purports to be a reconciliation between their Federal Income Tax returns and the books, shows this as an item of reconciliation. I have not examined their tax file correspondence, so I cannot pass upon whether they have asserted a claim with reference to this. I am familiar with [fol. 7349] the general method in which these things come up with the income tax authorities in the larger corporations. A field examiner comes around to examine the reports many years after they are made.

I know this. I was furnished a reconciliation of the Federal Income Tax returns as filed with the profits on the books, and in that reconciliation the item of two million dollars referred to by Mr. Thompson appeared as an item which was not claimed as a deduction. Now, whether they made a claim subsequent to the return, I don't know. But I do know that in the return as filed, as amended, it was not claimed. What has happened afterwards, I don't know. I don't assert anything in respect to it one way or the other, except so far as it affects the Exhibit 66.

During the course of my employment on behalf of the defendants in this case, I was requested to make some examination of the 1931 records, at a time quite subsequent to my first employment. I made an examination of 1931, but not to the extent that I made of the prior years, because of the lack of sufficient time. I furnished the work sheets on 1931 to Western Electric employes for checking, but they were not furnished as such. It merely happened that the 1931 figures were inserted on the working papers where they happened to fit in.

The following exhibits fail to include any figures as to earnings on investment, or any other figures with respect to the Western Electric Company for the year 1931; X-48 to X-65, inclusive; except X-49-A, which is a Western Electric statement. X-81 to 88, inclusive, X-99, and X-79. I don't believe any of the exhibits introduced through me cover the year 1931. The exhibits were prepared long before we had any access to the 1931 figures. When we began our work, the only figures available were for the years 1916 to 1930. Mr. Gregory's statement, with which we are drawing comparisons, cover the same period, so there was no

reason for including the year 1931. I did not have access to the books and records of the Western Electric Company for 1931 long before I went on the witness stand. We requested the right to examine for 1931 all the same books and records as we examined for the other years.

"Q. You made whatever examination you pleased of them?

A. I was restricted as far as time was concerned."

[fol. 7350] I don't mean that I didn't have the time to devote all my time to this examination. I had access to the 1930 figures back in January. As a matter of fact, I made no examination of the 1931 figures until away into April.

"Q. Do you know from Mr. Gregory's figures on his exhibits that the earnings of the Western Electric Company in its Bell business are the lowest for the year 1931 that they had been for any year in the period 1923 to date, except for the first part of 1932?

A. I am not familiar with the 1931 figures.

Q. Weren't you interested in the 1931 results?

A. Not particularly.

Q. Did you, yourself, determine that 1931 would not be put in here?

A. Well, I was instructed to prepare exhibits that would be comparable to A-77 and A-79, and, as I explained before, the exhibits were prepared long before I had any access to 1931 figures.

Q. Now, since you have had access to them, you know that the year 1931 is included in this controversy, don't you? You did know that, didn't you?

A. I don't know that I did. Mr. Gregory's exhibits A-77 and A-79 do not include 1931.

Q. But 78 and 80 do?

A. On an estimated basis.

Q. Yes, exactly, and then figures were brought in later. You knew that, didn't you, when the figures for 1931 were brought in. What I want to know—I am not going to pursue this further—I want to know whether you, as an accountant, determined that the year 1931 was not to go in this case, or whether some one else determined that.

A. Why, I did not determine anything relative to the year 1931.

Judge Wilkerson: I understand you to say you followed instructions?

A. When I first made up my exhibits, the year 1931 was not in the case, the figures were not available, the books were not available, and I made the exhibits."

In our Exhibits X-50, X-53 to 58, inclusive, 84, 86, and X-88, I have made certain adjustments on account of pension fund accruals, assuming that the exhibit numbers are correct. I will accept your figures subject to check that in [fol. 7351] these exhibits for the years 1916 to 1930, I have made the following adjustments to profits on account of this pension fund situation: I have increased the Bell profits by $1,558,000, I have reduced the non-Bell profits by $517,000, and I have increased the profits on the total business by $1,041,000.

I will accept your figures, subject to check that for the period 1923 to 1931, I increased the Bell profits by $5,912,000, the non-Bell profits by $1,350,000, and the total profits by $7,262,000.

The adjustments covering pension fund accruals all proceed upon the theory that the Western Electric Company had accrued larger amounts for Pension Fund purposes applicable to both its Bell and non-Bell business in the two periods than correct actuarial computations justify. In determining what the proper actuarial computations were, I used a statement identified as Exhibit D-26, the title of which reads as follows: "Actuarial computations of required pension fund accruals, 1916 to 1930, and minimum fund requirement." This sheet was furnished to counsel for the City of Chicago by the Western Electric Company. I don't know the date. I did not know by whom it was prepared. I did not know that after a controversy had arisen here in court, the company employed Dr. Arthur Hunter, chief actuary of the New York Life Insurance Company, to determine what the facts were in this connection. I did not see Dr. Hunter's exhibits before I put these exhibits in, that contained the adjustments on the pension fund accruals. I did not know that he had testified. I do not, by my exhibits or my testimony, undertake to express any opinion about the facts from an actuarial standpoint.

Fundamentally there was no difference in the method of my apportionment of these pension fund accruals between Bell and non-Bell business for the period prior to 1925 and

for the year 1925, and subsequent thereto. By use of the word "fundamentally" I mean that I attempted, in so far as possible to make the apportionment between the Bell and non-Bell on the same basis throughout.

It may be substantially different here due to the item of $1,400,000, which is the Graybar pension fund. Prior to 1925, the apportionment which I made was based on the cost of sales—I presume supplies were included. I don't know as [fol. 7352] a fact. I will have to examine my working papers before I can say whether, after 1925, my apportionment was based upon the Western Electric Company's method, which means that adjustments were apportioned on the basis of salaries, where, for instance, the installation and distribution houses were all Bell, and, in the case of the manufacturing department, the apportionment was on the basis of cost of sales.

"Q. I wish you would. You don't need to do it now. Then I want you to answer this question: If it is not a fact that, even upon your own theory, your method of apportionment prior to the year 1925 results in penalizing the Bell business, that is in increasing the profits on account of its pension fund accrual by approximately a million and a half more than you would have increased them if you followed the same method of this apportionment as you did follow for the years 1925 and subsequent thereto?

A. I can't answer that question, for I don't know.

Q. Will you look into it? I would like to have it answered.

A. I am afraid that it would involve considerable work on my part, and I don't think I should be called upon to do it.

Mr. Thompson: Well, your Honor, it is a curious situation; he brings in exhibits that make certain apportionments.

Mr. Goldstein: He accepted your figures.

Judge Wilkerson: Well, he will be governed by instructions of counsel, I suppose, as to what he will do, and they have called on you for a good many things.

Mr. Thompson:

Q. Do you decline to do this job?

A. It is not a matter of declining, Mr. Thompson. It is just a matter of, I don't know what the result would show

if I used any other basis. I have used the basis, I defined the basis.

Q. I ask you specifically whether there was a difference in the methods between these two periods; you say you don't know, you are going to answer that question?

A. I am going to answer that question by reference to my working papers.

Q. Will you also let me know tomorrow whether you decline to undertake or will undertake this other——

A. Yes.

[fol. 7353] Q. —this other investigation?

A. Yes, I will answer."

(Documents marked for Identification Exhibits A-216 and A-217, respectively.)

Exhibit A-216, being a statement furnished by the Western Electric, marked D-25, was before me when I did my work on Exhibits X-50 and X-53 to X-58, inclusive.

Exhibit A-217 is one of my work sheets. In Exhibit A-217, in the total additions to the fund opposite the year 1925, I have $4,977,000. I have a note to that which says that it includes $1,400,000 for pension fund, under agreement with the Graybar Electric Company. I come over to sheet D-25, furnished by the Western Electric Company, and I say that they have not included credits for pension fund accruals on the exhibits $1,400,000, because they use the figure there $3,576,305. What I did was to compare the total pension fund accruals for 1925, including the $1,400,000 for the supply department, against the pension fund accruals per actuarial computations, and I get a difference of $1,373,000, by which sum I adjusted profits. I do not see how it is $1,400,000 too much. The $1,400,000 that is in here is not in this figure. But the $1,400,000 is on the books in that particular year as a charge against non-Bell earnings. I was trying to adjust the figures which had been used by the Western Electric as credit for pension fund accruals, to the actuarial computations.

"Q. Now, in making that adjustment in every other year but 1925, you followed D-25. In 1925, you made the comparison as against a sum which included $1,400,000 reserve for pension fund for the supply department of the Western Electric, which had not been used by the Western Electric?

A. It is included in the Western Electric expense for that year.

Q. Exactly, but not reflected in these exhibits on account of the pension fund?

A. Not reflected in these exhibits.

Q. Nor any other exhibits?

A. But it is still reflected in the profits for the year. By doing this, I am not only adjusting the difference between this exhibit and the one showing actuarial calculations, but I am also excluding from profits the $1,400,000.

[fol. 7354] Q. That is the effect of it, isn't it?

A. Yes."

My understanding is that the $1,400,000 was included as an expense in Mr. Gregory's non-Bell exhibits.

I don't believe I was present; I do not recall hearing Mr. Gregory's testimony that, in making up his pension fund accruals, he had not included the $1,400,000 in the pension fund expenses of the supply department, that is, the non-Bell business. The most that I say for this is that it is not really an adjustment on account of pension fund, which it purports to be, but it is an adjustment to take the $1,400,000 out of the earnings of the Western Electric in its non-Bell business for that year.

It is included there merely because it related to pension fund, not to that specific calculation of pension fund, but it represented a pension fund set aside at that time for the Graybar employes. It is a proper adjustment in the exhibits. It is on account of pension fund that it is earmarked especially; I would not have to star it otherwise.

"Q. But when you came to make the comparison, while you earmarked it, when you came to make the comparison, you compared it, did you not, with the figure used by the Western, which did not include that sum, with the result that you got an adjustment of $1,400,000 larger than it would have been if you had used all the figures which have been used by Western in setting this up?

A. If I had adopted the method you describe, I would have shown the $1,400,000 in one separate column, I still would have made the adjustment of $1,400,000.

Exhibit 51 consists of three sheets, and purports to show average investment of the Western per Exhibits A-77 and A-79 adjusted before depreciation, net profits per Exhibits A-77 and A-79, and average return on investment.

Q. Now, you carried out these figures here, average return on investment. Are we to understand that this exhibit purports to show, as to the Bell business on the second sheet, what you believe to be the return on investment on a proper basis, or is this merely a calculation?

A. It is a calculation for the purpose of showing the effect of the adjustments that were made to the average investment as compared with Mr. Gregory's profits.

Q. But you do assert that the whole exhibit is on a basis [fol. 7355] so that the return on investment appearing in the third column means something?

A. I think that is self-evident from the exhibit itself. I have excluded from the average investment in column 1 of this exhibit (sheet 2, which is the Bell business), the notes payable to the trustee of pension fund and the American Telephone & Telegraph Company and to others, in a cumulative amount, for this entire period, of many millions.

Q. As a matter of fact, you have not decreased the profits at all by deducting from the profits $15,753,000 of interest applicable to the notes which you excluded?

A. Well, the purpose of this exhibit was not to show the investment and the profits on a comparable basis. It was merely to show the effects on the investment of these deductions.

Q. Mr. Witness, you not only show the average investment as adjusted to the net profits, but you carried out a return on investment?

Now, I want to know whether you say that doesn't mean anything, or, is the court to take that return as indicating anything?

Mr. Goldstein: Now, which exhibit are you now speaking about?

Mr. Thompson: Fifty-one, the second sheet.

A. Why, I think the exhibit speaks for itself.

Mr. Thompson: What I understand you did was this——

A. I admit that as far as the interest on the notes that are deducted here—as far as that interest is concerned, it is not taken out of this figure.

Judge Wilkerson: Pardon me just a moment. I suppose, having put this in, that we are to understand you

testify that the return on average investment before depreciation, is represented by these percentages which you put down in these columns, is that right?

A. Yes, but that is only one of the exhibits leading up to what might be called a final exhibit, where the adjustments are shown both on the assets and on the profits. It does show the effect of the asset base alone.

Judge Wilkerson: What I mean is, we don't want to be confused by this column headed "Percentage."

Mr. Thompson: Exactly.

[fol. 7356] Judge Wilkerson: We have a large number of exhibits here. Now, we take these exhibits and look at them. Are we to understand that you testify to something here about those percentages? What is your testimony about the percentages?

The Witness: I don't think I have testified to anything about percentages on this exhibit.

Judge Wilkerson: Well, what functions then do they serve?

Mr. Thompson: Exactly.

Judge Wilkerson: I say, what is their purpose in the exhibit? Are they evidence in the case, and if so, of what? Just what conclusion are we to draw from those percentages? That is what I am trying to get it. That applies not only to this, but to a large number of the exhibits. You have all kinds of percentages set out. Now, just what are we to do with those?

The Witness: Well, you understand, of course, that where you have two factors, this is, you have a factor of investment and a factor of profits, and you want to give effect to just one of the factors, naturally any comparison drawn between an adjustment on one factor without a corresponding adjustment on the other factor, does give an incorrect picture, but——

Judge Wilkerson: Well, in this case we have to make findings, and one of the findings which we will have to make will be the per cent profit of the Western Electric on its business, on the business with the Bell Company. Now, when we come to set down in our findings that percentage that we are required to find in this case, what use can we make of your column here? That is what I am trying to get at?

The Witness: Well, there is a later exhibit that adjusts both the profits and the rate base.

Judge Wilkerson: Is there an exhibit to which all these refer——

The Witness: Yes.

Judge Wilkerson (continuing): —which gives your idea as to what the profit is?

The Witness: Yes, and that is stated in the testimony.

Judge Wilkerson: All right."

I have a later exhibit in which I make adjustments to profits, and not to average investment. We have still another exhibit, our final exhibit, in which we adjust [fol. 7357] both profits and investment. This Exhibit 51, in all three of the sheets, I have adjusted by reducing the average investment, by taking out millions of dollars of notes payable. I have not decreased the profits by taking out the interest of more than fifteen and three-quarters million dollars applicable to the very notes that I have taken out. And the result is that my return shown in the third column here is correspondingly higher by the effect of that fifteen million dollars.

What has just been said with respect to Exhibit 51 applies equally to X-52, all three sheets of it. It applies to X-53 except that the conditions are reversed, the profits are adjusted, and not the investment. It applies to X-85. It does not apply to X-87. There are adjustments made in X-87 to profits and adjustments made to average investment. It applies to X-86.

What was said about the Exhibits X-51, X-52, X-85 and X-86, so far as reducing the investment by excluding notes payable to the trustee of the pension fund and others applies equally to the exclusion by me of excess cash, but not eliminating from profits the interest received on such cash.

Now, about these notes payable, I did not know that from 1927 to the present time the Western Electric Company has borrowed from the trustee of the pension fund all of the amounts in that fund, but I assumed from the size of the notes that it was practically all of the amounts. I do not know whether any of that has been repaid or not. Before I could say whether the Western Electric has had that money borrowed continuously from the trustee of the pension fund during a period commencing in 1927 down to and including the present time, I would really have to see that it was outstanding all the time. I did know it

was outstanding at the end of each year. Whether there were any repayments during the years, I don't know.

When I excluded, in my final exhibits, these loans from the trustee of the pension fund, I took into consideration the factor, that the Western Electric Company had had this money borrowed continuously from the trustee of the pension fund. If the company borrows ten million dollars, not on a bond issue, but on its unsecured notes, running for two years, and it invests the money in its [fol. 7358] business, then in figuring this average investment, I would exclude those notes, even though they were two year notes. They represent temporary working capital, not permanent capital. If they were five year notes, whether I would exclude them would depend upon the conditions under which the notes were issued, and would depend upon the purpose for which any rate of return might be shown. If the company borrowed ten million dollars for five years on notes it was going to use in its business generally, when I arrive at the average investment, whether I would exclude the notes depends upon specific conditions. Whether I would exclude it or not would depend upon the circumstances surrounding the individual case. I would exclude a mortgage obligation under certain conditions; under other conditions I would not. You can't generalize about such items.

I excluded the notes payable to the trustee of the pension fund in this case for two reasons. The first is, I do not see any distinction between money borrowed from the trustee of the pension fund and money borrowed from a bank. If you didn't have the trustee of the pension fund to borrow it from, you would have borrowed it from the bank. If I exclude the notes payable to the bank, I should exclude the notes payable to the trustee of the pension fund. The other reason is that the notes payable to the trustee of the pension fund are, in reality, in lieu of a reserve for pension fund.

The years prior to the time the money was with the trustee, it was in the pension fund, and I excluded the pension fund, therefore I also exclude the notes; a change of form.

I believe that as a matter of fact, what the Western Electric Company does, is to borrow large amounts of money from the trustee of the pension fund, and issue its demand notes for them, and then use that money in its business.

One of the reasons why I exclude that, is on the theory that it is a temporary borrowing. That is not the main reason. The main reason is that you should not include in your rate base, as a basis for an eight or ten per cent return, something that is borrowed, and upon which you are only paying 5½ or 4 per cent interest. The effect of it is to give the owners of the business a higher rate base. And they make [fol. 7359] the difference between the rate of return and the rate that they pay on the borrowed money.

The fact that the loan was temporary was one reason why I would not include it in the rate base. The second one, it was analogous to the reserve for pension fund; and the third, is because to include it in the rate base is to make a profit equal to the difference between the rate of return on the rate base and the amount paid to the trustee. The fact that these were demand notes is one of the factors.

I understood that this pension fund money was continuously in the business for a period of years. I considered all the elements, the form of the transaction, and the substance. I did the same with the money borrowed by the Western Electric from the American Telephone and Telegraph Company, where there was no obligation to return it under a year; I took that out because it was temporary. I did not see correspondence between the presidents of the two companies, showing that in 1929 and 1930, the Western Electric had had that money for at least a year. I did not know of the correspondence, but I don't think it would have changed my calculation. That the loans are temporary is one of the factors.

"Q. I have asked you about these two, to try to show you, to try to put to you, that if the loans were in fact not temporary, but for more than a year, would you still have excluded them?

A. If they are of the type of loan that you describe, yes."

Exhibits X-54 and X-55, not like the ones that we have been discussing, are exhibits which I want to be taken as showing what I claim to be the rate of return for the Western. In Exhibit X-54 I excluded certain cash which I claim to be excess cash, and excluded from the profits, interest at the rate of 2.5 per cent per annum. The rate of 2.5 per cent was a composite rate which was compiled from information shown in the report CR-714. I think it covered the period from about 1916 to—up to possibly 1927.

I don't recall if they went for the entire period or not. As a matter of fact, I did not exclude the so-called claimed excess cash in all years.

I don't know whether I could get an average of all of the years for the cash, because I would have to look at my [fol. 7360] working sheet on that to see just how I determined the rate. I recall I only took out cash in certain specific years. The largest amount was taken out in 1925. I don't know it to be a fact that in that year the records which I say I had an opportunity to inspect showed that the Western Electric Company earned on its cash balance 5 per cent. If it is true that the Western Electric earned 5 per cent on its cash balance in 1925, then, when I applied the two and a half per cent, which was an average, to the conditions in 1925, which was one year in which I took out a large amount of claimed excess cash, I penalized the Western Electric to the extent of two and a half per cent on over twenty million dollars, amounting to over half a million dollars. I made an investigation before I determined this adjustment. My working sheets show what I did on it.

What was just said with respect to this claimed excess cash and the use of two and a half per cent is true not only with respect to Exhibit X-54, but X-55, X-57, X-58, X-61, X-63 and X-64.

Exhibit X-99 is based upon an attempt to figure what the American Telephone and Telegraph Company would have earned on the dollars invested by it in the Western Electric Company without respect to the earnings of the company left in the business. Included in that exhibit, as a special item, is a special dividend paid by the Western Electric to its stockholders in the year 1927, which is treated as a receipt for the year 1927. It is set forth as a special item. I do not want to give the court the impression that the item is included with another item in the year 1927. It is set forth specially, but it is set forth in the year 1927, and shown as 88.32 per cent earning for that one thing. It includes earnings made by the International Western Electric Company and its subsidiaries and its predecessors in the foreign field from 1881 to 1927.

In Exhibit X-94 I show a number of adjustments to the 88 companies set forth in Gregory Exhibit A-85. Some of those adjustments are plus, and some are minus. I have not made any effort to find out what the effect would be

upon the return shown in Exhibit A-85 for these 88 companies if I gave effect to all of these adjustments.

I think it is self-evident from the exhibit that if you make adjustments aggregating twenty-five million dollars in one [fol. 7361] year, on one company, that that would have some effect on the rate of return shown for that company. And if you made the adjustment another way on another company, it would have some effect. These adjustments are not all one way. It is an easy, but a rather long job for an accountant to take these adjustments and find out how much effect it would have upon the figures appearing in Gregory Exhibit 85-A.

"Q. Yes. And as a matter of fact, it would just make a difference of three-tenths of one per cent; I put it to you whether you want to investigate that or not.

A. Well, that, of course, is subject to my counsel."

In Exhibit X-90 I make a comparison of the total operating and non-operating results of the Western Electric Company as shown in Poor's Manual, with the operating results of the Western Electric as shown on Exhibits A-77 and A-79. In making this comparison, the investment figures taken from Poor's Manual are, I believe, after reductions for notes payable. It is probably correct that no corresponding reduction was made in the profits on account of interest with respect to such notes. The figures which I use here, taken from Exhibits A-77 and A-79 have not been so reduced.

"Q. Now, what you have got here is a comparison on a basis that is wholly incomparable, haven't you?

A. I have a comparison which shows that if the Western Electric Company had been set up on the same basis as the 88 companies, the result would be entirely different."

When the plaintiff made its comparison in Exhibit A-85 between the Western and 88 companies, it was made on the basis that was testified to by Mr. Gregory.

I have compared the earnings of the Western on the one hand with the notes payable out, and with no reduction on account of interest attributable to those notes; and on the other hand, I have compared it with those notes in.

The purpose of the exhibit is to show that there is not any relation between the two, not to compare them. I have no knowledge at all as to the life in service, salvage, or any

other factor affecting the depreciation rates of the Western Electric Company on its machinery. I did not say yesterday that I had excluded from its expenses the two million dollars which the Western accrued in 1928, because I found [fol. 7362] that the average rate on machinery of these 88 companies was seven and a half per cent. I said that my understanding was that the Western Electric used a rate of 7½ per cent. And I said that my examination of the eighty-eight companies disclosed the fact that a great many of the companies—you understand, of course, all of the companies do not disclose their depreciation policy—but most of them that disclose it had rates below 7½ per cent.

I know as an accountant that each company, if it sets up its depreciation rates properly, reflects its own particular experience, except to the extent that it does use the experience of companies in similar lines of business as a guide. A particular manufacturing company can have an experience with respect to depreciation that is identical with another manufacturing company if they are in the same line of business. If the Western Electric Company makes central office equipment, and Stromberg-Carlson makes central office equipment, the depreciation rate of the two companies on machinery is not bound to be identical. Each company adopts its own basis but it is very likely the rate should be somewhat similar. All I said about the rates for the Western Electric was the fact that their rates in the main, are higher than other companies. I express no opinion as to the propriety of the Western Electric's rates. I have excluded two million dollars from the expenses of Western Electric in the period 1923 to 1930 because, in 1928, they changed their rates from 7½ to 10 per cent and made it retroactive for four years.

I have my own opinion as to whether 10% was a proper rate. The opinion is not based on nothing; it is based on rates in use by other manufacturing companies and not on the Western's experience at all. I have not been in any of the Western Electric Company's manufacturing establishments.

I have used the term "Excessive depreciation." That merely connotes the difference between the dollars resulting from the rates actually used by the Western Electric, and such sums as have been allowed up to date by the Government to the Western for the expense of depreciation in its income tax returns.

The term "excessive depreciation" is merely to distin-
[fol. 7363] guish it from "extraordinary depreciation" and to note the difference between the Western's rates and those allowed by the Government for income tax purposes.

Exhibit X-69 is an attempt to show the earnings of the International Western on the dollars originally invested in its business by the Western Electric Company, whereas X-67 is an attempt to show the earnings of the Western on its original dollar investment in the International. I think the exhibits speak for themselves. In column 3 of this exhibit, underneath "earnings" there appears the sum of $3,458,000, with a note to it. I don't know whether or not this figure includes a special dividend from the Western Electric Company, Limited, of Canada, of $3,028,000. I do know that there was a dividend income included in that year. I am not familiar with the names of the companies from whom the dividends were received. I merely know there is dividend income in that year. I don't know whether that represents earnings of a subsidiary of the International Western Electric Company, not only during this period 1918 to 1924, in this particular case, but long prior thereto. I have included this, and I have no knowledge as to what the fact is, as to whether the earnings represented by that dividend were made in a period long prior to this. In considering the rate of return, I have treated it as of this particular year. I have included in the Western Electric Company's average investment shown on this exhibit only its stock investment. If I had added loans made by it to the International Western Electric, and then increased its net earnings, by the amount of the interest, whether the result would have been a much lower rate of return would depend upon whatever the facts show. I have not made the calculation.

If the rate of return paid on these loans was less than the rate of return shown by this statement, it would reflect the result. I don't know whether it was lower or not. I did not say that they paid an average rate of interest as high as 18 per cent. I said I didn't know what effect it would have. If the rate of interest paid on these loans was less than 6 per cent, then the inclusion of these loans, if materially large, as a part of the investment, and adjusting the earnings for the interest would result in materially reducing the
[fol. 7364] calculation which I have shown in this exhibit.

In Exhibit X-82, I have assumed a 10 per cent return

on the average investment of the Western Electric Company as shown in Mr. Gregory's exhibits and have proceeded to arrive at the per cent return on this assumed basis, first, on the average capital stock, and second, on average capital stock and surplus applicable to operation. I don't know the operating earnings of the Western Electric Company in this period or whether they were 8½ per cent instead of 10. The purpose of this statement is not to tie them up with the actual earnings at all. I don't know what the computation is as to the extent that the computed returns are higher than the actual. For the year 1930, I show a 10 per cent return of $28,935,000. The actual earnings for that year, as shown on the Gregory exhibit, were $12,934,000 or about 4½ per cent of the total business; so what I am really doing here is to assume 10 per cent return that the Western said was the proper return on its business, and set it up in this exhibit to show what the result would be if that return had been realized, although it was not in fact realized.

June 9, 1932.

I have referred to the provisions of a preferred stock certificate of the Graybar Electric Company, which gave to the Western Electric as the holder of preferred stock of Graybar a certain participation in net earnings. Net earnings is defined in the certificate itself. (Counsel reads from said certificate as follows):

"The term 'net earnings' as used in Sub-Division 1 of Sub-Paragraph A, shall be deemed to mean, net earnings as determined under the corporation's established accounting methods, and after the deduction of the following items:

A. All taxes except United States Income Taxes.

B. Payments into the Pension Fund of the corporation, covering the current accrued liability, pursuant to the provisions of the corporation's plan for employes' pensions, disability benefits, and death benefits, but excluding payments to make up deficiencies in said Pension Fund.

[fol. 7365] C. Cumulative dividends upon preferred stock.

D. The sum of $450,000 for each year."

The following exhibits which have been identified during the course of my examination are based on the stockholders' original investment, without regard to undistributed earn-

ings left in the business; X-67 relating to the International Western Electric; X-69, International Western; X-72, the top block of that exhibit relating to Graybar; X-79 relating to Electrical Research Products in so far as it affects the first computation, there are two computations, one is on the basis of the original investment, and the other gives effect to the accumulation of earnings; X-82, one column is Capital Stock, and the other is Capital Stock and Surplus; X-81, Northern Electric, which is based on the original investment.

In Exhibits X-86, X-87 and X-88 I have made an adjustment of $2,000,000 on account of the sale of certain property by the Western Electric to the Bell Telephone Laboratories in the year 1925.

In Exhibits X-83 to X-88 I have included in the profits of the Western Electric Company as adjusted, either in whole or in part, the profit resulting from the sale of the International Western Electric, which I have heretofore discussed.

The exhibits are not all comparable as to the question of net profits. Exhibits 83, 84 and 85 are on one basis, and 86, 87 and 88 are on a different basis.

Exhibit X-84 is "Consolidated average investment, profits and per cent of return of Western Electric Company and its subsidiaries." In the year 1930 I bring the Teletype into this consolidated statement. I brought in the same companies that the Western Electric Company itself brought in, in making up its consolidated statement. If the Teletype is in Mr. Gegory's figures, it is in these figures. I arrived at the average investment here, by taking the average investment at the beginning and the end of the year, and dividing it. The Western Electric Co. purchased Teletype for approximately $30,000,000. There is an item of $23,000,000 appearing on the books of Teletype for good will. I believe that I excluded that item in this exhibit. The net result of that was that I have reduced the investment appearing in this consolidated return by one-half of [fol. 7366] $23,000,000 for the year 1930. I did that because there is an item of good will appearing on the Teletype books, although Western paid $30,000,000 in cash for Teletype. I gave the same treatment to this Teletype situation as I have described in Exhibit X-84, also in Exhibits X-85, X-87 and X-88.

Redirect examination.

By Mr. Goldstein:

Referring to a question on cross-examination relative to the $1,400,000 Graybar Pension Fund, provided for in the year 1928, as to whether or not it was included in non-Bell operating expenses, I have made an investigation since yesterday to find the fact. I find that in Exhibit D-19, which has been previously introduced, the item of $1,400,000 appears in the column "Additions to Employes' Benefit Fund," under the general caption, "Non-Bell Customers," in the year 1925, as a charge against the Non-Bell operations of that year. There is a footnote in D-19 which states specifically that the additional liability for Pension Fund which is charged as a non-Bell operating expense, has reference to this particular $1,400,000. The footnote reads, "Include $1,400,000 reserve for Graybar Electric Company, Inc., Pension Fund."

I was asked about my change in the method of making the allocation of the Pension Fund accruals prior to and subsequent to 1925. I have investigated my records and I find that when I made the allocation I had before me a copy of Exhibit D-19, entitled, "Western Electric, Inc., Analysis of Cost of Sales by Bell and non-Bell Customers." It covers the years 1916 to 1930, inclusive. That was furnished by the Western Electric.

I found that in the years prior to 1925, there was no direct allocation made by Mr. Gregory of the amount added to Employes' Benefit Fund, whereas for the years 1925 to 1928, there appears in the column "Additions to Employes' Benefit Fund" amounts representing the amount allocated both to Bell and non-Bell customers in those specific years.

With reference to pension fund liability taken up as part of the shop cost in the year 1916 to 1925, D-19 shows nothing, but Exhibit D-72 indicates that the Pension Fund liability was taken up as a part of the shop cost, and was there-
[fol. 7367] fore on Mr. Gregory's basis distributed on the shop cost of sales.

This shop cost of sales is included on this Exhibit D-19 in one column, and that was the basis used by me in allocating the Pension Fund adjustments in the years 1916 to 1924. That is, I follow the shop cost of sales, because for that period it indicated that they were included in shop cost of

sales, and shop cost of sales was distributed between non Bell and Bell on the basis of cost of sales.

On cross-examination I was asked what annual reports I had in mind when I testified on direct examination as to the reason why I made the allocation of profit in 1925, on the sale of the International Western, to the period from 1918 to 1925. I have made an investigation as to those records and found that the annual reports which I had in mind were the annual report for the year 1914, the second page beginning with the paragraph, "It will be impossible," and the annual report for the year 1917, the paragraph beginning at the bottom of page 1 and ending on page 2, and the annual report for the year 1918, the comments in the president's letter under the heading of "Foreign," and the annual report for the year 1919, the comments in the president's letter under the heading of "Foreign." Also in the report for the year 1917 it states that there was no return on foreign investments. The profits prior to 1918 were capitalized in the $7,500,000 investment set up in 1918, and my contention is that the profits from 1881 to 1918 were either taken out by the Western Electric Company as dividends during that period, or capitalized in the investment of $7,500,000 set up in 1918.

(Motion to strike what witness' contention is. No ruling.)

The $7,500,000 had to come from some place.

We do not have any different practice in our firm as to certifying statements than the practice of other accountants generally. In the instant case I was not given free access to all of the books, records, files and contracts without restrictions. When we first began our work we were informed that all of the information that we required in connection with the exhibits, which we were to check, was contained in certain data which was made available to us by Mr. Gregory, that is, the working papers. In some cases [fol. 7368] there were things that I wanted, and called for, that I did not get.

I had a conversation with Mr. Gregory with reference to access to the records, and the procedure which was to be followed with reference to getting information. I do not recall the identical conversation, but the substance of it was to the effect that any records of the company that we desired, or books, we would have to ask for, and in most

cases we were requested to put them in writing, and after putting them in writing, and submitting them to Mr. Gregory's office, we were frequently told that the request would have to be submitted to counsel before we could be given an answer.

In request No. 11-B, I asked permission to examine the Journal with reference to the Journal entries pertaining to extraordinary depreciation for the years 1924, 1925, 1926 and 1927.

"Q. And were you given permission to make the examination?

Mr. Thompson: Those are the Journal entries—pardon me. Those were the Journal entries that you introduced in one of your exhibits here in court?

Mr. Goldstein: He was furnished them; he was not given permission to examine anything."

I made requests for documents from the Western Electric Company. My conversation was usually with Mr. Gregory.

In apportioning the reserve for depreciation between Bell and non-Bell business, about which I was asked on cross-examination, I used the plant apportionment as calculated by Mr. Gregory. The apportionment of the depreciation reserve in connection with the exhibit in which I used the plant apportionment, was solely to give effect to the apportionment of the adjustment for depreciation reserve.

(Counsel agree that "Erpi" means Electrical Research Products, Inc.)

"Q. You were asked yesterday about the Erpi Foreign Investment. Did that Foreign Investment come from the earnings of the Electrical Research Products, or the original investment of the Western Electric Company?

A. Yes."

[fol. 7369] Since cross-examination I made an investigation as to the basis upon which the Pension Fund accruals were built up as used in Exhibits A-77 and A-79. I found that the Pension Fund accruals as used in Exhibit A-77 and A-79 were built up of a charge against operation of the total required accruals, excepting a limited rate of income represented by the interest paid to the trustee of the Pension Fund.

(Counsel for city states that they are not passing on what is or is not required nor on any actuarial question.)

I am merely stating that the total additions to the Pension Fund in those particular years represent the amount which the Western Electric appropriated, plus the amount of 5.5 per cent interest, or whatever rate was paid to the trustee of the Pension Fund. If the Pension Fund should earn more interest, than the rate of interest computed as a basis for the accrual charges, the accrual charges to operating earnings would be reduced to a corresponding amount.

When I was asked on cross-examination if the $48,000,000 dividend came from non-Bell business from 1881, and I answered "Yes," I had in mind Exhibit D-61, which showed such a possible source, and did not have any other facts upon which I could base a conclusion as to the source of this dividend, as the data supporting Exhibit D-61 were refused me.

Exhibits X-55 and X-88 give the final conclusion of all the adjustments on Bell and non-Bell business, and on the company as a whole, both as to the rate base and as to profit.

"Judge Wilkerson: Now, about this matter of inspection; this matter of the inspection of books has come up right along here in this case. As I have said before, the court does not propose to have this case go off and come back here again on any question of the inspection or production of books. Hard as it may be in the hot weather, if necessary we will stick with this thing until every reasonable requirement has been complied with. If counsel will bring the matter to our attention, and have a specific complaint about what it is that they wanted to see, and could not see; or if there are any documents in here that represent—a summary of the books, why, of course, they are entitled to [fol. 7370] see the books. Now, there has been a large number of indefinite complaints made here, and I do not know for what purpose—whether it is to base an argument upon, that after all, this case will have to come back here again, and be heard over, because the court had made a mistake in not compelling the inspection or production of books. Now, we do not intend to have this case go off in that way.—And I will say that if it takes all summer we will stay here to make a record on that; but we expect to have our attention

called to specific things about which complaint is made. * * * I think this: I think either the matter should be brought before the court in some concrete way, in which the court is invited to rule with reference to specific books, as to which access has been denied, or the leveling of these general accusations should stop in this case.

Mr. Goldstein: Just as bearing upon the question of the state of the record, there are two angles to the question of the refusal. One is, if the information is part of the case of the plaintiff, we have a right to show the refusal to give us access, not for the purpose of having the case reversed, because it is not there, but as bearing upon the question as to whether they have made the proper proof in a case where they must show confiscation.

But if the facts are not in the record, and the question is, shall the court take judicial notice of certain practices in their own experience, and they say because—their witnesses testify that "because of our experience over a period of years, we find that so and so," and we show that we tried to get at specific facts, and they have refused them, in our opinion that has a bearing as to whether or not they have—their testimony of the general practice should be accepted."

Recross-examination.

By Mr. Thompson:

I started my work of examining the records of the Western Electric Company in this case about the last week of December, 1931. I have had three assistants at times; most of the time I have had two. Mr. Whitworth, one of the Chicago partners of Touche, Niven & Co. has also been engaged in the case. We keep a record of the day's work that we have spent.

(Counsel for Plaintiff asks for said time record and defendants' counsel agrees to furnish it.)

I was here part of the time when Mr. Gregory testified; not all of the time. I have not examined pages 4, 5, 6, 7 [fol. 7371] and 8 of Exhibit A-73 introduced by the plaintiff in this case and which purports to show statements submitted directly to Touche, Niven & Company, from December 29, 1931 to February 26, 1932, in New York; then submitted to Touche, Niven & Company January 18, 1932 to March 9, 1932, at the Hawthorne Works, to find

out whether that is a correct statement of information which had been furnished to us up to the date these sheets bear. I will find out whether that is correct or not.

I do not know whether it is a fact that the Western Electric Company brought into this court room at the time Mr. Gregory was on the stand, five ledgers of the Western Electric Company, 16 journals and 29 cash books, or a total of 50 books of the Western, and all of the other books that are listed, all of the other records of its subsidiary corporations that are listed on A-74, together with 102 folders of work papers. After the first hearing in this case, the books were taken back to New York and at my request records were held in New York for three or four days before they were sent back here, because we were engaged in an examination of the underlying data that had been used in Mr. Gregory's exhibits. I do not know how many records or whether all of them were held there.

I believe plaintiff was called up in Chicago and told that it would be a great accommodation to us if those records could be held in New York. However, I did not call you. I had an office at 195 Broadway. I think we occupied it during the months of January and February, and again for about two or two and a half weeks in April. That was furnished by the Western Electric Company. We used it for the purpose of examining the Western Electric books and records there. They prepared a lot of statements in response to requests. I did not ask them to prepare statements. In some cases I asked them for certain things and they of their own volition supplied the statements.

When the question arose out here as to a reconciliation of shop variations and other adjustments, I believe that Mr. Hagberg and the accountants of the Western Electric Company worked together. He was furnished with an office at the Illinois Bell Telephone Company. I cannot say many of his assistants worked there or for what period of time, because I was not present. I went over there to the build-
[fol. 7372] ing once or twice and spent about a half an hour. I believe that a large amount of records and work sheets and data were made available to Mr. Hagberg over there.

I cannot say offhand how many days we occupied the office in New York. Our men were there week in and week out. I don't know how many days our forces occupied quarters of the Illinois Bell Telephone Company, because I was in New York a good part of the time.

"Mr. Thompson: I call your Honor's attention to the fact that Mr. Gregory, when his exhibits were offered in evidence, had in court, and the record so shows, all of the books and records of the Western Electric Company and its subsidiaries referred to in Exhibit A-74, and also 102 binders containing his working papers, and that no objection was made to the introduction in evidence of those exhibits on the ground that any information had been denied to the defendants."

R. C. RAINWATER, called as a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Goldstein:

June 10, 1932.

My name is R. C. Rainwater, I reside at Wheaton, Illinois, I am a licensed public accountant, occupying the position of Examiner of Accounts for the Illinois Commerce Commission. I have occupied that position about 11 years. Three years before coming to the employment of the Illinois Commerce Commission, I was accountant for the Southern Illinois Light & Power Company, an Illinois corporation operating public utilities in this State.

As Examiner of Accounts for the Illinois Commerce Commission I examine the accounts, books and records of the various Public Utilities under the jurisdiction of the Illinois Commerce Commission, upon direction by the Commisson to make such investigation whenever the Commission consider it necessary, and prepare reports based thereon. I [fol. 7373] have been actively engaged in the preparation of the present case on behalf of the Illinois Commerce Commission.

"Mr. Goldstein: I offer in evidence Defendants' Exhibit X-103, entitled 'A. T. & T. Co. (excluding long lines)—Analysis of the Estimated Costs of (1) Carrying investment in the physical property used in rendering license contract services, (2) Holding funds available during period to meet cash requirements of licensee companies and (3) Temporary financing of the licensee companies,' for the period 1919 to 1931.

Also, X-104, entitled 'A. T. & T. Co.—Statement of total revenues and expenses, showing separately (1) Long Lines Department Operations, (2) License Contract Operations, and (3) Holding Company Operations, Schedule 3001 of Report to the Interstate Commerce Commission,' for the period 1920 to 1931. These sheets were sent by the American Telephone & Telegraph Company to the defendants. The sheets 1923 to 1930 are at the offices of the Illinois Bell Telephone Company, and I would ask that they be produced, that they produce them and attach them as a part of this exhibit.

Also, Exhibit X-105, entitled 'A. T. & T. Co.—Statement of average assets, showing separately, (1) Long Lines Department Operations, (2) License Contract Operations, and (3) Holding Company Operations, Schedule 200-A of Report to the Interstate Commerce Commission,' for the years 1920 to 1931. The sheets for the years 1923 to 1930, inclusive, are at the offices of the Illinois Bell Telephone Company, and we will have them produced, and attached as a part of this Exhibit.

Also, Exhibit X106, a document prepared by the American Telephone & Telegraph Company, entitled 'A. T. & T. Co.—Allocation of Taxes, 1923-1930,—Heiss Exhibit No. 10. Analysis of Taxes 1920-1930,' consisting of three sheets, and being an analysis of taxes for each year 1920 to 1930, inclusive.

Also, Exhibit X-107, a statement furnished by the American Telephone & Telegraph Company, entitled 'A. T. & T. Co.—Instrument Maintenance, Years 1923-1927—Heiss Exhibit No. 10,' the corresponding sheets for the period 1920 to 1922 being at the offices of the Illinois Bell Telephone Company, to be attached as a part of this Exhibit."

The Witness (continues): Exhibit X-108, entitled "A. T. [fol. 7374] & T. Co.—Average Cost of Funds used in Business" for each of the years 1920 to 1930, inclusive, was prepared by me or under my direction.

All of the figures shown in X-108 were furnished by the Company excepting those in the column marked "Per Cent" and the figures in the line marked "Total" immediately preceding the line marked "Grand Total."

The figures in the "Per Cent" column were computed by me and represent the per cent of the various items of sources of funds to the "Grand Total" of funds used in the particular year in the business.

The second "Per Cent" column contains the per cents of the various items of dividends, interest and amortization charges to the "Grand Total" of such charges during each of the years.

The line "Total" immediately preceding "Grand Total" represents the sum of the items designated as "Funded Debt," "Loans from Associated Companies, Loans from Bankers and Notes Payable to Pension Fund Trustees," during each of the years 1920 to 1930, inclusive, and the per cent that the total of these items bears to the "Grand Total."

Exhibit X-109, entitled "A. T. & T. Co.—Computation of Annual Cost of Furnishing Telephone Instruments to Chicago Division of Illinois Bell Telephone Company, Year Ended December 31, 1923,"—was prepared by me or under my direction.

The figure under "Totals all Licensees"—10,030,484—was computed from a sheet entitled "Average Number of Stations in service for each company receiving the license contract services, years 1923 to 1930, inclusive."

The figure 660,927 was also taken from the same sheet furnished by plaintiff.

The third line, "Per Cent Chicago Division"—6.589 per cent—is a mathematical calculation of the relation of 660,927 to 10,030,484.

The figure $31,329,013, representing the American Telephone & Telegraph Company's average investment in telephone instruments, was taken from X-103; and the amount of $2,064,269 represents the Chicago proportion, using the percentage shown above.

The average depreciation reserve, $14,971,542, was com- [fol. 7375] puted from D-100 and computed on the basis of the average of the balances for the beginning and ending of each year. The portion of depreciation reserve shown in the last column under Illinois Bell—Chicago Division—is the result of applying the percentage 6.589.

The average investment in telephone instruments, less average depreciation reserve, $16,357,471, for all licensees, and $1,077,794 for Illinois Bell Telephone Company—Chicago Division—represents the average investment computed in the manner already described, less the average depreciation reserve also computed in the manner described. This is the same basis of determining the investment in

telephone instruments as used by Mr. Heiss in Exhibit A-166.

The figure $74,044 represents the return on the average investment in telephone instruments less depreciation reserve at the same rate which Mr. Heiss calculated to be the annual cost of the funds for the year 1923, shown in X-108, and which is also used by him in A-166.

Repairs $1,086,422 was taken from X-107, and $71,584 is the portion thereof allocable to Chicago division.

Depreciation Expense $2,133,172 was taken from X-107 and the portion allocable to the Chicago Division is shown in the last column.

Taxes, $54,720, was taken from the books of the Illinois Bell Telephone Company.

Insurance and Contingencies, $21,556, is an amount which has been added to correspond to the estimate which the company used in its set-up of estimated annual charges for the year 1923 at the former hearing, as shown in Rec., Vol. 3, p. 1038.

This Exhibit X-109 shows in the last line that the annual cost of furnishing instruments for the year 1923 was $362,459, which includes all the expenses, such as depreciation, maintenance, taxes, insurance and contingencies, and provides a return on investment equal to the annual cost of funds to the American Telephone & Telegraph Company during the year 1923—such cost of funds being the amount which the American Telephone & Telegraph Company has represented to be the annual amount paid by it currently on funds used in its business which were derived from its funded and other indebtedness and from its capital and [fol. 7376] surplus, and includes dividends paid by the American Telephone & Telegraph Company at the rate of 9 per cent.

Exhibit X-110, entitled "Illinois Bell Telephone Co.—Chicago Division—Comparison of Company's Tabulation, Record, Vol. III, 1038, of Annual Cost of Furnishing Telephone Instruments with Commission Accountants' Computation, as per sheet attached, of Annual Cost of Furnishing Telephone Instruments for the year ended December 31, 1923," was prepared by me, or under my direction.

The figures shown in the first column entitled "Company's tabulation (Rec., Vol. III, p. 1038)," amounting to $709,007, were taken from the Company's tabulation offered at the former hearing in 1929, being the annual cost of tele-

phone instruments if the Illinois Bell had owned the instruments in that year.

The first column represents the showing by the Illinois Bell at the former hearing of what the annual cost would be on the basis of the Illinois Bell purchasing the telephone instruments in the year 1923. The figures shown in the second column, entitled "Commission Accountants' Computation, as per X-109," represent a reproduction of the annual cost as shown in X-109. They are the same figures as were shown in the preceding exhibit. The figures in the third and fourth columns represent the amount and per cent of excess of Company's tabulation over Commission Accountants' Computation.

Exhibit X-110 shows that the Company's tabulation used for the average investment in telephone instruments in the Chicago area was $3,494,271; that the American Telephone & Telegraph Company's actual investment, as shown in the Commission Accountants' computation per X-109 for these same telephone instruments was $2,064,269; and that the Company's tabulation of what the investment would have been if the Illinois Bell were the owner of the instruments purchased in that year of them exceeded the American Telephone & Telegraph Company's actual investment in such instruments by $1,430,002 or 69.27 per cent excess.

The figures in the first line are on the basis of comparison of undepreciated investment on the books of the American Telephone & Telegraph Company, in the second column, [fol. 7377] with the Illinois Bell's presentation of the cost —what the cost would have been if purchased in the open market, that is before depreciation.

The second line shows that the Company's tabulation in 1923 did not include any depreciation for the telephone instruments at all but considered that the instruments which would be in use in that year would be new instruments purchased in the open market.

The amount of $986,475 is the portion of the depreciation reserve shown on the books of the American Telephone & Telegraph Company, allocable to its investment in telephone instruments in that year in use in Chicago, making a net investment of $1,077,794, as compared with the Company's tabulation of $3,494,271. When I say "Company's tabulation," I mean the Company's tabulation of what the investment would have been on the basis of its purchase,—

that is $3,494,271 as per the company's tabulations as compared to the American Telephone & Telegraph Company's investment after depreciation reserve of $1,077,794.

The Company's investment figure is $2,416,477 in excess of the American Telephone & Telegraph net investment, or an increase of 224.21 per cent, all as shown in the third line. The figure $279,542 represents the number of dollars resulting from the Company's calculation of 8 per cent return on investment.

The figure $74,044 is the return on investment to the American Telephone & Telegraph Company based upon the annual cost of funds of 6.87 per cent, as shown in X-108. The amount of $205,498 represents the excess of the return on investment as computed by the Company's tabulation at the 1929 hearings over the return on investment to the American Telephone & Telegraph Company based upon its annual cost of funds, or an excess of 277.53 per cent.

The figures for repairs, depreciation, taxes, insurance and contingencies shown under heading "Excess of Company's Tabulation over Commission Accountants' Computation" represent the subtraction of column 2 from column 1 and the per cent of excess of column 1 over column 2.

The line "Total Annual Cost of Furnishing Telephone Instruments," shows that on the Company's Tabulation at the 1929 hearings the annual cost is computed at $709,007, and the computation made on the basis of the actual invest- [fol. 7378] ment of American Telephone & Telegraph Company in telephone instruments, results in an annual cost of $362,469, including therein a return on investment at the rate of the annual cost of funds, which would produce an excess annual cost for the year of $346,548, or 95.61 per cent in excess of the cost shown in X-109. That is, $709,007 which the Illinois Bell at the former hearing said would be the annual cost if it were the owner of the instruments, compares with $362,459 which was the actual annual cost to the American Telephone & Telegraph Company for those instruments in that year based upon a return to it of 6.87 per cent, enough to take care of its carrying charges, and the 9 per cent dividend allocable to that investment—and left an excess of $346,548.

The figures designated as "Average Cost of Furnishing Instruments per Telephone Station in Service" are the annual costs expressed in dollars per station, showing $1.07 per company's tabulation in 1929, 55 cents per tabula-

tion in X-109, and resulting in an excess, on the Company's tabulation, of 52 cents per station. That is the Company's presentation in 1929 was $1.07 per station, and the American Telephone & Telegraph Company's actual experience was 55 cents per station.

The figures opposite the line "Average Investment in Telephone Instruments per Telephone Station in Service" show that on the Company's tabulation the average investment per station was $5.29, before depreciation, and the tabulation in X-109 shows the investment to be $3.12, resulting in an excess of the Company's computation of $2.17 per station.

On the basis of the American Telephone & Telegraph Company's actual investment less depreciation reserve, the figure is $1.63 per station. The Company's tabulation shows an excess investment of $3.66 per station. That is, the Company's figures in 1929 used as a basis an investment of $5.29 per station, and the American Telephone & Telegraph Company's actual investment was $1.63 per station.

Exhibit X-111, is entitled "A. T. & T. Co.—Amount of Return on Investment in Telephone Instruments shown by Company's tabulation—Rec., 1038—related to amount of investment in telephone instruments shown by Commission Accountants' computation during year ended December 31, 1923."

[fol. 7379] Item 1, "Average Investment in Telephone Instruments less depreciation," amount of $1,077,794 was taken from X-110. Item 2, "Return on Average Investment at Rate of Cost of Funds," 6.87 per cent, was taken from X-110.

Item 3, "Additional Profit to American Telephone & Telegraph Company for corporate surplus," was taken from X-110, and represents the excess of the return on the basis of the Company's tabulation in 1929, over the cost shown in X-109.

Item 4 is the total of Items 2 and 3 and shows that the total return to the American Telephone & Telegraph Company on its net investment resulting from the Company's tabulation of annual cost of $709,007 would be $420,592, which is 39.02 per cent on what its net investment was in the year 1923.

Item 6 shows that the figure of 39.02 per cent on its investment in telephone instruments results in a return to the American Telephone & Telegraph Company's stockholders

on their proportionate stock investment of 59.53 per cent after taking care of interest on funded debt, and amortization charges.

In the M. R. reports 1, 22-A, 22-B, C. R. 51-A, 53, 67, 67-B, 76 and 97, in Provisional Estimate Statement E, in Annual Report to Stockholders of the American Telephone & Telegraph Company and in Bell Telephone Securities Manuals used by the American Telephone & Telegraph Company, I found a showing of return on capital stock similar to the return that I have expressed in the percentage 59.53.

In Exhibit X-112, entitled "A. T. & T. Co.—Per Cent of Return on Investment in Telephone Instruments used by the Illinois Bell Telephone Company, Chicago Division, per Exhibit A-200"—that is Plaintiff's Exhibit A-200 in this hearing—"Fair Allowance for Telephone Instruments in Chicago Division (Exhibit A-163), Less Costs already included during Years 1923 to 1927, inclusive (Costs shown in Exhibit A-170)." Item 1, under "Net Investment in Telephone Instruments, American Telephone & Telegraph Company," was taken from Plaintiff's Exhibit A-166.

Item 2, "Investment Allocated to Long Lines" was computed from A-166, using the percentages shown therein.
[fol. 7380] Item 3, "Investment of Associated Companies" represents Item 1 minus Item 2.

Item 4, "Investment Allocated to Chicago Division," was computed from A-166 on the basis of percentages therein.

Item 5, "Return on Investment, Chicago Division," was taken from A-166 and is the return on investment at the rate of annual cost of funds to the American Telephone & Telegraph Company, which rate is shown on Line 6, and includes the payment of a dividend of $9 per share on the capital stock after taking care of interest and amortization charges.

Item 6—"Per cent of Return on Investment, Chicago Division," is at the annual rate of cost of funds taken from A-166.

Item 7 is the amount of dollars of additional return in excess of the return equal to the annual cost of funds which is included in the amount of fair allowance on telephone instruments in A-200, as claimed by Mr. Heiss.

Item 8 is the per cent of additional return on investment represented by additional return shown in line 7.

Item 9 shows the total number of dollars return included

in the computations in A-200 of fair allowance on telephone instruments.

Line 10 shows that the amount of return included as part of the fair allowance on telephone instruments by Mr. Heiss, results in a return in the year 1923 on the net investment of the American Telephone & Telegraph Company of 20.40 per cent; in the year 1924, 20.80 per cent; in the year 1925, 20.20 per cent; in the year 1926, 18.34 per cent; and in the year 1927, 17.31 per cent.

I will explain what I mean by the words in Item 7; "Additional Return on Investment." Exhibit A-200, Item D, Line 2, refers to fair allowance for telephone instruments in the Chicago Area, Exhibit A-163, less costs already included in Item B above. For the year 1923 that amount is $145,625. This figure is from the exhibit offered by Mr. Heiss, designated as A-200. Now in another exhibit that Mr. Heiss offered, Exhibit A-163, he computed the cost of furnishing the telephone instruments. The "Investment" referred to in Exhibit X-112 is the allocated proportion of book investment of the American Telephone & Telegraph Company, less the average depreciation reserve shown on its books.

[fol. 7381] "Judge Wilkerson: Why do you call it a return?

Mr. Goldstein: I will explain it, if your Honor please. When Mr. Heiss was on the witness stand, if your Honor will recall, I asked Mr. Heiss this question:

'If you add $145,000 in that column, Fair Allowance to the amount you already show in A-163, which itself included a return on the investment of 6.87, how much would the entire amount be, available for return on the investment in telephone instruments?'

And he said: 'I could not figure it out mathematically.'

Judge Wilkerson: And so you have had it figured out.

Mr. Goldstein: We have had it figured out.

Mr. Blackman: So that your Honor may understand the whole thing, Mr. Heiss proceeded to build up his costs, which he said was the actual cost of the operations on the license contract. In that, he found that the instruments had cost so much, and that there had been so much of reserve set aside. He deducted the reserve from the original cost, and he said, the American Telephone & Telegraph Company has that much investment today in those instruments, or it did in 1923 to 1927.

Then he took a rate of the cost of money, and he applied it to that balance of investment. Now, he says that is what it cost the American Telephone & Telegraph Company, as a minimum, or any principle. But, he says, if we are determining whether that is a fair contract or not, on any basis, the American Telephone & Telegraph Company would be entitled to charge for those instruments precisely what the Illinois Bell did.

Judge Wilkerson: The term 'return' does not refer to any actual return.

Mr. Blackman: No, and it is very misleading.

Judge Wilkerson: And the term "investment" refers to no actual investment.

Mr. Blackman: That is correct.

Judge Wilkerson: You mean, then, this is an exhibit which you propose to use, when you come to discuss Mr. Heiss' testimony?

Mr. Goldstein: That is correct.

Judge Wilkerson: All right.

[fol. 7382] Mr. Goldstein: That is correct, to show what it would lead to."

Statement by Mr. Goldstein:

"Exhibit X-113, entitled 'A. T. & T. Co.—Percent of return on investment in telephone instruments used by Illinois Bell Telephone Company, Chicago Division, if total return is reduced by amount of taxes on instruments during years 1923 to 1927 inclusive' is the same as X-112, but gives credit for taxes for which the American Telephone & Telegraph Company reimbursed the Illinois Bell, and which Mr. Heiss did not put in, in his exhibit, either by oversight or otherwise, and reduces the amount of that return by that amount."

(Witness continues:) Exhibit X-114 entitled "A. T. & T. Co.—Percent of return on investment in telephone instruments used by Associated Companies, per Exhibit A-198, 'Fair Allowance for Telephone Instruments, Exhibit A-202 less costs shown in Exhibit A-170,' years 1923-7" was prepared in exactly the same manner as X-112 excepting that it covers the return to the American Telephone & Telegraph Company on its net investment in telephone instruments held for the Associated Companies, resulting from the fair allowance which Mr. Heiss claimed in Exhibit A-198.

Line 9 shows per cent of total return on telephone instruments investment in Associated Companies (Item 8 divided by Item 3), for the year 1923, 21.17 per cent; for the year 1924, 21.23 per cent; for the year 1925, 21.03 per cent; for the year 1926, 19.27 per cent; and for the year 1927, 17.82 per cent.

Item 7, Exhibit X-112, is called "Additional Return" because in Exhibit A-163, an amount of return had already been allocated at the rate of the cost of funds, amounting to $73,948; so this is an additional return on investment.

The last line merely converts those returns to a return on capital stock.

In Exhibit X-115, entitled "A. T. & T. Co.—Comparison of claims of Plaintiff for return on investment in Telephone Instruments used by Ill. Bell Tel. Co.—Chicago Division—with A. T. & T. Co.'s actual experience for year [fol. 7383] ended December 31, 1923," the figures shown in column A designated as "Presentation during the year 1929, Rec., Volume III, page 1038" were taken from the record page designated at the heading of the column.

"Judge Wilkerson: All you have to do is to have him say he got the figures from the sources stated in the exhibit and that the computations in his opinion are correct. These exhibits seem to be plain and explain exactly where the figures came from."

I think the sources from which the figures in X-115 were taken are all shown on the face of the exhibit, and, in my opinion, the computations are correct.

In Exhibit X-116, entitled "A. T. & T. Co.—Profit of Furnishing Telephone Instruments to Chicago Division, Illinois Bell Telephone Company, on Basis of Annual Allowance of $1.13 per Station made by Public Utilities Commission in Order of December 20, 1920," the figures Average Stations in Service, for all licensee companies, and the total for the Illinois Bell Telephone Company, Chicago Division, were taken from the sheet furnished us by the company, showing the average number of stations in service.

Exhibit X-116 is prepared in a similar manner to X-109, and the sources are the same.

In X-117, entitled "A. T. & T. Co.—Computation of Annual Cost of Furnishing Telephone Instruments to Chica-

go Division of Illinois Bell Telephone Company, Year ended December 31, 1920," the sources for the figures are the figures furnished by the Company, or the Public Utilities Commission order itself. The computations in my opinion are correct.

The sources for Exhibit X-118, entitled "A. T. & T. Co.—Percent of Return on Investment from Furnishing Telephone Instruments to Chicago Division of Illinois Bell Telephone Company on Basis of Annual Allowance of $1.19 per Telephone Station made by Public Utilities Commission in Order of December 20, 1920, during year ended December 31, 1920," are the same as for Exhibit X-117, and in my opinion the computations are correct.

In Exhibit X-119, entitled "A. T. & T. Co.—Percent of Excess of Average Current Cost of Telephone Instruments used by Illinois Bell Telephone Company, Chicago Division, shown by Plaintiff's Exhibit A-163, over Book Cost computed from Plaintiff's Exhibit A-166, during years 1923 to 1927, inclusive," the sources are indicated either [fol. 7384] in the body or in the heading of the exhibit. I think the computations are self-explanatory.

The working papers have been available to the plaintiff at all times.

In Exhibit X-120, entitled "A. T. & T. Co.—Percent of excess of Average Current Cost of Telephone Instruments used by Bell System shown by Defendants' Exhibit 122 over Book Cost shown by Plaintiff's Exhibit A-166, during years 1923 to 1927, inclusive," the sources are explained either in the body of the exhibit or in the heading.

The computations are, in my opinion, correct, and the working papers have been made available to the plaintiff.

In Exhibit X-121, entitled "A. T. & T. Co.—Percent of Relationship of Book Value of Investment in Telephone instruments to Depreciation Reserve for Telephone Instruments, Compared with Per cent of Depreciation deducted from Book Cost or Current Value New as the Basis for Sale to Long Lines and to Licensee Companies, as of Dec. 31, 1927," the figures were taken from Exhibit D-100, and the computations, in my opinion, are correct.

The last column shows the per cent of depreciation deducted from the book value, in the case of the various classes of telephone instruments, and the effect of the sale of telephone instruments, and the clearance through the depreciation reserve.

Exhibit X-122 is entitled "Investments in capital stocks of licensee companies, Dec. 31, 1919 to 1930 inclusive." It shows the par value of the American Telephone & Telegraph Company stockholdings in each of the licensee companies in the United States as of December 31st of each year, 1919 to 1930, inclusive, and shows under each company on the first line the American Telephone & Telegraph Company holdings,—par value; second line, American Telephone & Telegraph Company holdings, book value; and third line, per cent of American Telephone & Telegraph Company ownership in the stockholdings of each of the Licensee Companies, such per cent being the result of the ownership held directly in this company or through the stock of other subsidiaries which is owned by the controlling company.

The figures in the first two lines in the case of each company show the direct stockholdings of the American Tele-
[fol. 7385] phone & Telegraph Company. As shown in the note on the last page of this exhibit, unless otherwise specified, all of the American Telephone & Telegraph Company holdings refer to common stock.

The figures shown in Exhibit X-122 were all taken from the Annual Reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission.

Exhibit X-123 is entitled "Dividend rates of Licensee Companies, during years 1914-1930," inclusive. All of the figures shown in this exhibit were taken from the annual reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission and its predecessor, the Illinois Public Utilities Commission.

Exhibit X-124, entitled "Capital Stockholdings in Licensee Companies showing dividend rates and yields thereon, years 1920-1930, inclusive," shows, during each of the years, the average American Telephone & Telegraph Company stockholdings—par value; the average American Telephone & Telegraph Company stockholdings—book value; the dividend rate on the average American Telephone & Telegraph Company stockholdings—par value; and the yield to the American Telephone & Telegraph Company on average stockholdings—book value. Item I was computed, in the case of all companies, paying dividends during the period, by dividing the total dividends paid by the dividend rate, with proper adjustment when the divi-

dend rate was changed during the year. In the case of the companies paying no dividends during the year, the average par value was determined by an average of the balances at the beginning and end of the year.

Item 2 shows the average book investment in the stocks of the Licensee Companies, and reflects the variations from the par value to the extent that the book investment of the American Telephone & Telegraph Company in such stock differs from the par value of such stock.

The figures in Line 3 represent the dividend rate on the par value, and the figures in Line 4 represent the conversion of the dividend rate to the rate based on the American Telephone & Telegraph Company's investment in the stock shown in Item 2.

The figures in X-124 were all computed from X-122, and [fol. 7386] X-123, and the working papers used in connection with these other two exhibits.

No computation has been made for the year 1931.

Exhibit X-125, entitled "Dividend Rates on Investments in Capital Stocks of Licensee Companies, years 1920-1930, inclusive," was taken from Exhibit X-124. The computations in lines "Average dividend to American Telephone & Telegraph Company on par value of stockholdings in Licensee Companies," and "Par Value of stockholdings on Licensee Companies, exclusive of Illinois Bell Telephone Company," are in my opinion correct.

In Exhibit X-126, entitled "Dividend Yields on Investments in Capital Stocks of Licensee Companies, years 1920-1930, inclusive," the figures for each of the companies were taken from X-124. This exhibit shows the yield on the actual investment in Illinois Bell Telephone Company, and in the balance of the System, resulting from dividend rates paid on the stock held by the American Telephone & Telegraph Company in these various companies.

Exhibit X-127, entitled "Average return to A. T. & T. from Dividends on its Investments in Capital Stocks of Licensee Companies converted into average return to Stockholders of A. T. & T. on their investments in capital stock of A. T. & T. during years 1920 to 1930, incl.," converts the yield to the American Telephone & Telegraph Company from dividends on its investment in the Associated Companies, into average return to stockholders on their investment, in a manner similar to the one I have already described.

In Exhibit X-128, entitled "Profit on investment in capital stocks of Licensee Companies during years 1920 to 1930, incl.," the figures were computed from X-126 and X-108, and the computations are all in my opinion correct, and the working papers have all been made available to the plaintiff.

In Exhibit X-129, entitled "Ratio of capital stockholdings in Ill. Bell to capital stockholdings in all Licensee companies; ratio of profit on stockholdings in Ill. Bell to profit on stockhodings in all Licensee Companies and Percentages of Profit on stockholdings during the years 1920 to 1930, incl.," the figures shown in Lines 1, 2 and 3 were taken from X-124; Lines 4, 5 and 6, from X-128; and Lines 7, 8, 9, 10 and 11 are computations made from these figures and in my opinion are correct.

[fol. 7387] The significant lines on this exhibit are Lines 7 and 8; Line 8 is the ratio of profit or amount carried to surplus of the American Telephone & Telegraph Company from its investment in the stock of the Illinois Bell Telephone Company, to its total profit on stockholdings in all licensee companies.

Lines 7 and 8 show the extent to which the per cent of investment in Illinois Bell and the balance of the System, contributed toward the corporate surplus of the American Telephone & Telegraph Company in the particular years indicated.

In Exhibit X-130, entitled "Amounts Required in Order to Receive the same per cent of return on investment in capital stock of each licensee company as received from investment in capital stock of Illinois Bell Tel. Co. during years 1920 to 1930, incl.," the sources of the figures are Exhibits X-124 and X-128. The exhibit shows the amount in dollars required in order that the American Telephone & Telegraph Company should receive the same per cent return on its investment in the capital stock of each licensee company as it received from its investment in the capital stock of the Illinois Bell during each of the years 1920 to 1930. The figures and the computations are all self-explanatory.

Exhibit X-131, entitled "Losses on Loans to Licensee Companies pro-rated between companies, years 1920-1930, incl.," apportions among the various licensee companies, the losses on loans made to the Bell System, which Mr. Heiss has included in his exhibits as losses to the American

Telephone & Telegraph Company, as part of the cost of the license contract.

The working papers and the method of computation in connection with this have been made available to the plaintiff.

Exhibit X-132, entitled "Profit or Loss on Investments in Licensee Companies, years 1920-1930, incl.," shows the combined return to the American Telephone & Telegraph Company from its investment in each of the Licensee companies, both from stock and from loan investments, and shows the extent to which the combined return exceeded or failed to meet the annual cost of funds to the American Telephone & Telegraph Company during the particular year.

The figures in this exhibit, as to the stockholdings, are taken from Exhibit X-128, and the figures for the loans [fol. 7388] are taken from Exhibit X-131. The computations are, in my opinion, correct.

Exhibit X-133, entitled "Average return from Dividends and Interest on investments (stocks and loans) in Licensee Companies during years 1920 to 1930, incl.," shows the average return on combined investment of the American Telephone & Telegraph Company from stocks and loans of each of the licensee companies, including the Illinois Bell, and from all of the licensee companies exclusive of the Illinois Bell. In my opinion the computations are correct.

Exhibit X-134, entitled "Average return to A. T. & T. from Dividends and Interest on its investments (stocks and loans) in licensee companies, converted into average return to stockholders of A. T. & T. on their investments in capital stock of A. T. & T. during years 1920 to 1930, incl.," converts the per cent of return on investment to per cent of return to the stockholders of the American Telephone & Telegraph Company in a manner similar to the one that I have already described, as shown in the reports of the American Telephone & Telegraph Company and as stated before.

Exhibit X-135, entitled "A. T. & T. Ratio of Capital Investment in Illinois Bell to capital investment in all licensee companies; ratio of profit on capital investment in Ill. Bell to profit on capital investment in all licensee companies and percentages of profit on investment during years 1920 to 1930, inclusive," was prepared from X-132

and shows the extent to which the return to the American Telephone & Telegraph Company from its investment in the Illinois Bell contributed towards its surplus, compared to the return to the American Telephone & Telegraph Company from the other licensee companies, during each of the years 1920 to 1930, inclusive, and shows the ratio of the amount of its holdings in stock or loans of the American Telephone & Telegraph Company in the Illinois Bell to that of the balance of the System. The computations are all computations that I have made myself, and in my opinion they are correct.

(Exhibits X-136 to Exhibit X-143, inclusive, offered in evidence.)

Exhibits X-136 to X-143, inclusive, entitled, respectively, as follows: "X-136—Percentage relationships of average [fol. 7389] investments in capital stocks of licensee companies and in loans to licensee companies to total average investments (stocks and loans) in licensee companies, years ended Dec. 31, 1920 to 1930, inclusive.

X-137—Amounts required in order to receive the same per cent of return on investment (stock and loans) in each licensee company as received from investment in Ill. Bell during years 1920 to 1930, inclusive.

X-138—A. T. & T. Co.—Losses on Holding Funds Available to meet cash requirements of Licensee Companies Prorated between companies on basis of estimated annual requirements years 1920 to 1930, inclusive.

X-139—American Telephone & Tel. Co.—Cost of Furnishing Telephone Instruments to Licensee Companies Year ended December 31, 1920 to 1927, inclusive.

X-140—A. T. & T. Co.—Cost of Other Services Performed under License Contract Pro-rated to Licensee Companies on Basis of License Payments, Years 1920 to 1930, inclusive.

Departmental costs incurred in rendering Licensee Contract Services, during years 1920 to 1930, incl.

X-141—American Tel. & Tel. Co.—(1) Estimate of Costs Incurred in Rendering License Contract Services; (2) Amounts received for License Contract Services Years 1919 (5 months) to 1922.

X-142—A. T. & T. Co.—Separation of the Licensee Payments of each Licensee Company into Component parts

of cost and profit, years ended December 31, 1920 to 1930, inclusive.

X-143—A. T. & T. Co.—Items shown in Exhibit Reduced to Per Cents of the License Payment and to amounts per Telephone Station, Years ended Dec. 31, 1920 to 1930, inclusive," either show on their faces or the working papers which have been submitted to the plaintiff show the sources of the figures, and the basis of the computations.

June 13, 1932.

The Company's showing of income in Exhibit A-53 deducted Federal Income Tax for each year. I have computed the saving in income tax which would have resulted to the Illinois Bell for the years 1923 to 1930, on the basis of the Illinois Bell being financed in the same ratio of loans [fol. 7390] and stock as that which prevailed in the balance of the Bell system as shown in X-136. The amounts of such savings are as follows:

Year	Entire Company	Chicago Division
1923	$77,306	$50,875
1924	107,336	71,196
1925	104,982	69,844
1926	57,413	38,185
1927	79,576	52,528
1928	62,743	41,473
1929	36,026	23,586
1930	134,673	87,079

This saving would be due to the fact that as the loans to the Illinois Bell increased to equal the average of the System, there would be more interest to deduct for purposes of Federal income tax computations. I have the working papers from which these computations were made and the plaintiff may examine them.

Exhibit X-138 shows the distribution of the losses between the various licensee companies, and I took the figures from CR 13. The exhibit does not make any apportionments on the basis of the purpose for which the moneys were held in relation to stocks and bonds. I just lumped those together.

With reference to Exhibit X-142, I used a different method of allocating losses on holding funds to meet the cash requirements of the licensee companies, as indicated in Item 6 of Exhibit X-142, than Mr. Heiss did in Exhibit A-169.

Mr. Heiss allocated the losses sustained in connection with holding funds available for the Chicago area on the basis of a composite ratio using the bases of estimated cash requirements, plant and gross additions.

In making my allocations of Item 6, in my Exhibit X-142, I have used as a basis the estimated cash requirements of the licensee companies only. The sources of information used by the plaintiff were the M. R. and C. R. Reports, indicated in D-118; also the C. R. 13 Reports, and the Provisional Estimates. Of these reports only the C. R. 13's were available to us prior to the trial and prior to the offering of the A-exhibits. We used the C. R. 13 reports in allocating the losses on holding funds available. I included [fol. 7391] Item 2 in Exhibit X-142 because in all documents sent to us prior to the trial, Mr. Heiss included within the license contract costs, losses to the American Telephone & Telegraph Company on holding funds for the purchase of stock and for the making of loans, and losses to the American Telephone & Telegraph Company incurred in connection with loans to the licensee companies, but Mr. Heiss did not show the profits to the American Telephone & Telegraph Company while holding the stock, nor did he take into account any inequality as between the licensees as to the per cent of return paid to the American Telephone & Telegraph Company for moneys furnished in the form of stock and loans resulting from a difference in the dividend rates on the stock or through a difference in the proportions of stock and loan moneys furnished to the licensee companies.

In our exhibits, we have taken into account the losses on loans, losses on holding funds available for stock and loans and have also taken into account the difference in the dividend rates and ratio of loans and stock purchases as between licensees on the basis of the Illinois Bell Telephone Company's return to the American Telephone & Telegraph Company.

The differences, from an accounting standpoint, between the A-exhibits offered at the final hearings on the license contract, and the exhibits which were furnished to us prior to the trial, as bearing upon the license contract are as follows:

First, in the exhibits sent to us prior to the trial there was no separation of costs or expenses incurred chargeable

to the license contract payments for the long lines; instead, the costs allocable to services of the long lines and to the licensees were treated as a unit, but there was added to the revenues from the license contract an amount of revenue as coming from the Long Lines Department.

Second, in the exhibits sent us prior to the trial there was a lump sum deduction from all of the expenses represented to have been incurred in connection with the license contract to represent the amount allocable to holding company operations. In the Heiss exhibits there is a detailed separation for each of the classes of services.

Third, in the papers sent us prior to the trial, there was no allocation to the Chicago Area; nor was there any alloca- [fol. 7392] tion made to the Illinois Bell in any of the exhibits sent us prior to the trial, nor was there any statement made prior to the trial, nor was there any indication given that the Chicago Area would not be charged with losses on loans which Mr. Heiss' exhibits sent us showed were made to the Illinois Bell; and we were advised that the allocation to the Chicago Area would be made at the trial and the method explained at that time.

Fourth, the documents which they sent us showing the allocation made to the Ohio Bell showed a basis of allocation on an entirely different basis than the one they used at the trial.

(Exhibit X-144 offered in evidence.)

Exhibit X-144, entitled "A. T. & T. Co.—Per Cents of Licensee Payments Available for Corporate Surplus (For Profit After Payment of Dividends, Interest, and Amortization Charges) during years 1920 to 1930, inclusive," was prepared from X-142. This exhibit excludes from consideration the equalizing factor of the return from stock and loans, which is Item 2 of X-142, because that factor is considered in a later exhibit. Excepting for that, it takes X-142, and shows the result.

Exhibit X-145, entitled "A. T. & T. Co.—Return on Investment from License Contract Operations with Various Licensees during Years 1920 to 1927, inclusive," was taken from X-142, X-103, D-116 (which is Heiss' Exhibit No. 10 in the Ohio case) and from the statements furnished by the company for the years 1920 to 1922, which are similar to D-116.

The investment was set up to correspond to the item of expense set forth in X-142, such items being the loans to the licensee companies, the proportion of funds held available for the licensee companies, the investment in telephone instruments and the investment in miscellaneous property. The allocations between the companies were made on the same basis as X-142.

The items of return on investment are the same as Mr. Heiss used in Exhibit X-104. In my opinion, the computations in the exhibit are correct.

Exhibit X-146, "American Tel. & Tel. Co.—Return from License Contract Operations with Ill. Bell Tel. Co. in Excess of the Average Return from License Contract Operations with *Other* Licensee Companies during years 1920 to 1927, [fol. 7393] inclusive," was prepared from X-145 for the years 1920 to 1927, inclusive, and from X-142 for years 1928, 1929 and 1930. The comparisons for the years 1920 to 1927 were prepared somewhat differently than for the years 1928 to 1930, inclusive.

During the years prior to 1928, there were amounts available for additional return on investment to the American Telephone & Telegraph Company from the license payment after charging thereto the various amounts allocated in respect to each company. The excess of return on the investment in Illinois Bell for such additional amounts over the corresponding return on investment of the other licensees is shown in Item 6 of X-146.

During the years 1928, 1929 and 1930, there were no amounts left over from the license payments after pro rating the costs between the various companies.

In those years our Exhibit X-142 shows that the license payment was not sufficient to take care of all of the items of cost.

In comparing the showing of the Illinois Bell with the other licensee companies for these years, after charging against the license payment the losses on the loans and the losses on holding funds available, we computed the difference between the amount left over from the license payment to meet the cost of other services in the case of the Illinois Bell and that of the other licensees.

Exhibit X-147, entitled "A. T. & T. Co.—Return from License Contract Operations under Present rates and under Attacked Rates with Illinois Bell Tel. Co., Chicago Division, in Excess of the Average Return from License Con-

tract Operations, with *Other* Licensee Companies, during years 1923 to 1930, inclusive," was computed from X-146, Exhibit A-52, and from an exhibit which will be offered by Mr. Cummings on interstate separation.

In Exhibit X-148, entitled "A. T. & T. Co.—Separation of the License Payments of Illinois Bell Tel. Co., Chicago Division, of other Licensee Companies (including Ill. Bell Tel. Co., exclusive of Chicago Division) and of Long Lines Department, into Component Parts of Cost and Profit Based on Plantiff's Exhibit A-170 and Underlying Exhibits Referred to therein, during years 1923 to 1931, inclusive," the item of license payment was taken from A-53 and D-116, while the remaining items were taken from A-170 and the [fol. 7394] underlying exhibits referred to therein.

The figures shown in X-149, entitled "A. T. & T. Co.—Return of Investment from License Contract Operations with Illinois Bell Telephone Co., Chicago Division, with other Licensee Companies (including Illinois Bell Tel. Co., exclusive of Chicago Division), and with Long Lines Department, Computed from Plaintiff's Exhibit A-170 and underlying exhibits referred to therein, during years 1923 to 1927, inclusive," were prepared from A-170 and underlying exhibits. In Exhibit A-170, Mr. Heiss shows the losses on loans but did not show the amounts of the loans which we took from Exhibit X-103.

Exhibit X-150, entitled "A. T. & T. Co.—Return from License Contract Operations with Ill. Bell Tel. Co., Chicago Division, in excess of the Average Return from License Contract Operations with *Other* Licensee Companies (Computed from Plaintiff's Exhibit A-170 and Underlying Exhibits referred to therein), during years 1923 to 1931, inclusive," was computed from X-149.

Exhibit X-151, entitled "American Telephone and Telegraph Company—Return from License Contract Operations under Present Rates and under Attacked Rates with Illinois Bell Telephone Co., Chicago Division, in Excess of the Average Return from License Contract Operations with *Other* Licensee Companies (Computed from Plantiff's Exhibit A-170 and Underlying Exhibits Referred to therein) during Years 1923 to 1931, inclusive," was prepared from X-150, Plaitniff's Exhibit A-52, and exhibit to be offered by Mr. Cummings and is similar to X-147.

Exhibit X-152, entitled "A. T. & T. Co.—Composite of Estimated Requirements, Plant Investment and Gross Ad-

ditions—Per cent. Long Lines of Associated Operating Companies and Long Lines (Basis of Plaintiff's Exhibit A-169), 1923-1931. Estimated requirements (as shown by work sheets of Plaintiff's Exhibit A-169), 1923-31," consists of the work sheets of Plaintiff's Exhibit A-169, which were furnished by the plaintiff.

The sources for the figures shown in Exhibit X-153, entitled "Ill. Bell Tel. Co.—Comparison of Cash Payments to Western Electric Company with Cash obtained in stock and loans from American Tel. & Tel. Co. Years 1923 to 1930, inclusive," are clearly set forth on the face of the exhibit.

[fol. 7395] As to all of my exhibits, in my opinion, the computations set forth, and the results which are set forth in those exhibits, are all correct. Generally as to all of my license contract exhibits thus far they have not concerned themselves with the question of whether any amounts charged in the license contract were proper, or whether the amounts as charged were proper operating charges. My exhibits merely concern themselves with the distribution of the license payments, and the license contract costs, as represented by plaintiff, between the various licensee companies.

(Exhibits identified by Mr. Rainwater, X-103 to X-153, inclusive, offered in evidence subject to cross-examination.)

(Cross-examination reserved.)

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[fol. 7396] W. M. Hammond, called as a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Goldstein:

June 14, 1932.

My name is W. M. Hammond. I reside at Springfield, Illinois. My present position is chief accountant of the Illinois Commerce Commission. I have had that position about fourteen years and four months. Prior to that, I was assistant chief accountant of the Commission, for approximately two years, and examiner of accounts, for the re-

mainder of the time. I was engaged prior to that in accounting, statistical and financial analysis work. In the [fol. 7397] employ of various railroads—three different companies.

I had charge of the preparation of financial, statistical and operating reports, and spent considerable time in preparing matter for presentation to the State Commissions and to the Interstate Commerce Commission, on rate matters; and some other proceedings.

In connection with my duties as chief accountant for the Illinois Commerce Commission, one branch of the work has been in the handling of investigations in connection with securities issues. Since 1919 I have personally heard for the Commission practically all applications for authority to issue stocks, bonds and other securities.

In connection with those hearings it has been my duty to examine witnesses, to make such investigations as seemed necessary and desirable, to make recommendations to the Commission on the case, and to suggest what I deemed an appropriate form of order.

Under the existing law, applications made to the Interstate Commerce Commission involving railroads operating in Illinois are referred to the Illinois Commerce Commission for the purpose of affording opportunity of making recommendations. Those are handled by me, investigated, and a report made to the Commission, with recommendations to any representations, and if so, what, I deem appropriate to have made before the Interstate Commerce Commission. That involves a study, more or less, of the cost of funds, and the general level of security prices and rates.

I also hear all applications for, and make recommendations to the Illinois Commerce Commission in connection with all plans for the reorganization of utilities under the jurisdiction of the Illinois Commerce Commission.

For the last several years, four or five years, I have heard practically all applications for authority to sell or lease public utility property.

We have a department subdivision covering the preparation and classification of accounts and accounting rules which the Commission prescribes for the use of public utilities, in keeping their accounts.

I also handle accounting matters that may be of joint interest between the Illinois Commerce Commission and the Interstate Commerce Commission, particularly matters re-

lating to the interpretation of existing accounting rules, [fol. 7398] and revisions and changes therein from time to time.

I prepared, with the assistance of my staff, the Uniform System of Accounts for electric utilities, for gas utilities, for water and heating utilities, which was prescribed for use by the Public Utilities Commission of Illinois in 1918.

My department prepares, under my supervision, the forms of reports to be rendered and required by law to the Illinois Commerce Commission, by all utilities under its jurisdiction.

These reports when received are analyzed, and the data prepared for the use of the Commission and others.

In 1931, there were 753 utility companies under the jurisdiction of the Illinois Commerce Commission, representing an investment in Illinois of approximately $1,850,000,000, exclusive of railroad, express and telegraph companies, and the American Telephone and Telegraph Company.

The number of applications for authority to issue securities for the last twelve years under my supervision, has been approximately 1,687 involving issues aggregating more than $2,000,000,000.

I also have supervision over the audit and investigation of accounts and records of public utilities under the jurisdiction of the Commission, the greater part of such investigation having relation to the authorization of securities, reorganization and rate matters.

In connection with the work of the Interstate Commerce Commission, my work has been particularly in the matter of depreciation of telephone property. The Interstate Commerce Commission entered an order on November 1926, which is in the record in this proceeding, Record Volume 1, in which it was provided that the Interstate Commerce Commission would receive recommendations from the State Commissions as to the rates for depreciation of various classes of telephone property.

The Association of State Commissioners has created a committee for the purpose of collaborating with the Interstate Commerce Commission and with other State Commissions with respect to the determination of proper rates for depreciation to be recommended to the Interstate Commerce Commission.

[fol. 7399] Now, the further or final order in this case was entered July 28, 1931, in which the Commission confirmed

the previous order of 1926 with respect to the recommendations of the State Commissions.

During the year 1930, I served as chairman of the Committee of the National Association dealing with this matter. In 1931, I served as a member, and since the early part of 1932, have been serving as chairman of the committee.

I have served on the committee on Statistics and Accounts during the last twelve years, for approximately one-half the time, and have been chairman of the committee a portion of the time.

I was one of three accountants of the National Association who drafted systems of accounts for electric and gas utilities, which have since been approved and are now in use by some twenty-seven commissions, approximately.

In connection with the instant case, I have made certain studies with reference to bonds and stocks.

There were four main studies made on bond issues under my supervision, the work covering a period of twelve months, entailing the work of from three to ten persons. A check of the studies has been going on almost continuously to the present time, both in Chicago and by sending persons to Washington to check the figures against the official records of the Interstate Commerce Commission.

A study was made of 330 long-term bond issues of $5,000,000 or more, issued during the years 1921 to 1931, inclusive, aggregating $6,138,000,000 covering railroads, Bell System telephone companies, and public utilities other than the Bell System companies, in respect to the annual cost to the company and the yield on offering price of the issue, where the authorization of such issue was approved by the Interstate Commerce Commission or by one or more of ten State Commissions from whose official records information was obtained.

The State Commissions from which the information was obtained were as follows:

California, Maryland, New York, Illinois, Massachusetts, Ohio, Wisconsin, Maine, New Jersey, and Vermont.

Of these issues we have made a further study of 271 of the 330 issues which were issued during the year 1923 to 1931, aggregating $5,184,000,000 to show the spread between the [fol. 7400] annual cost to the company and the yield on the offering price of the issues, grouped according to Moody's investment rating in the year of offer.

The second study was a study of 878 long-term bond issues

of $5,000,000 or more, issued during the years 1923 to 1931, aggregating $14,345,000,000 of railroads, the Bell System Telephone Companies, public utilities other than the Bell System, and industrial and other companies in respect to the amount offered and the proportion of the total offering in each case grouped according to Moody's investment rating at the time of offering.

The third was a study of the yield on offering price of the 829 bond issues of $5,000,000 or over and issued during 1923 to 1931, aggregating $13,809,000,000, issued by railroads, Bell System Telephone Companies, public utilities other than the Bell System companies, and industrial and other companies in respect to the yield on public offering price of the bonds classified according to their investment rating when issued.

After excluding from the 829 issues all convertible bond issues and bond issues carrying stock purchase warrants, a further (the fourth) study was made of the remaining 720 issues aggregating $11,347,000,000 in respect to the resale price of such issues for each of the years from the date of issue to 1931, inclusive, grouped according to the investment rating at the date of issue and also grouped according to the investment rating in the year of resale.

The result of these studies has been reduced by me to summaries shown in exhibit form and in charts.

These summaries and charts have been reprodnced in detail in connection with each of these studies, grouped according to subject matter.

They have also been reduced to exhibit form, and copies of them have been furnished to the plaintiff.

In my opinion, through the use of these sheets, the accuracy of the charts and the summaries, and the method of their computation, can be determined.

Exhibit X-227 is a chart entitled "Cost to companies, yield to public and spread between cost and yield on offering price of bonds," is a graphic reproduction of Exhibit X-229.

I think it is fully self-explanatory.

Exhibit X-228 is a chart entitled "Spread between annual [fol. 7401] cost to company and yield on public offering price, 330 bond issues, 1921-1931, aggregating $6,138,000,000," is likewise a reproduction from Exhibit X-229. It is based on figures in the last three columns of X-229.

Exhibit X-229 is entitled "Comparative statement show-

ing cost to companies and yield to public on bonds issued by Bell System, Railroads and Public Utilities, other than Bell System, average for each year 1921 to 1931, inclusive."

The heading states the subject matter. The figures underlying the computations relating to the cost of the company were taken from the official records of the Interstate Commerce Commission.

The figures for the railroads were likewise taken from the Interstate Commerce Commission, and, for the public utilities, were taken from the official records of the Illinois Commerce Commission and from the records of the State Commissions above stated.

The figures underlying computations under "yield to the public," were taken from the Commercial and Financial Chronicle and Moody's Investment Manual, and Poor's.

The spread between the average cost to the company and the average yield to the public is the difference between the first and second groups of figures.

Exhibit 230 is a chart entitled "Bonds grouped by ratings (Moody's) showing amount in each group and its proportion to total offering, 878 issues, 1923-1931, aggregating $14,345,000,000."

This exhibit shows for the Bell System, railroads, public utilities and industrials, the percentage of total amount of bonds issued in each year represented by each classification of bonds based on Moody's ratings.

Exhibit X-231 is a chart entitled "Bonds grouped by ratings (Moody's) showing amount in each group and its proportion to total offering, 878 issues 1923-1931, aggregating $14,345,000,000."

It shows the same facts as X-230 in different form, together with some additional amounts representing issues on which Moody's ratings were not available.

Exhibit X-232 consists of three pages and is entitled "Comparative summary showing amount offered and proportion of total offerings of Bell System, railroad, public utility (other than Bell System) and industrial and other [fol. 7402] bond issues of $5,000,000 and over, issued during years 1923 to 1931, inclusive, grouped according to investment rating at time of public offering."

This exhibit shows the figures on which Exhibits X-230 and X-231 are based.

Exhibit X-233 is a chart entitled "Spread between annual cost to company and yield on public offering price, 271 bond

issues 1923-1931, aggregating $5,184,000,000, grouped by ratings (Moody's)."

This exhibit is I believe self-explanatory. It shows in graphic form the data given in the last three columns of Exhibit X-235.

Exhibit X-234 is a chart entitled "Trend of spread between annual cost to company and yield on public offering price, 271 bond issues, 1923-1931, aggregating $5,184,000,000, grouped by ratings (Moody's)."

This exhibit also shows in graphic form the data shown in the last three columns of X-235 and is I believe self-explanatory. It is noted here again that the ratings are of the year offered.

Exhibit X-235 is entitled "Cost of money to Bell System, railroad and public utility companies and yield to public on bonds issued in years 1923 to 1931, inclusive, classified according to investment rating when issued."

The heading states the subject matter. The exhibit contains the detail for Exhibit X-233 and Exhibit X-234.

Exhibit X-236 is a chart entitled "Trend of weighted averages of bond yields on public offering price grouped by ratings (Moody's), 829 issues, 1923-1931, aggregating $13,809,000,000."

This exhibit is apparently well described on the face of it. I might say, it shows in the upper portion all of the bond issues, including the convertible issues and issues with stock purchase warrants, and in the lower portion of the exhibit, the issues excluding the convertibles and those with stock purchase warrants.

Exhibit X-237, is entitled "Average yield on bonds sold during years 1923 to 1931, inclusive, classified according to investment rating when issued, Bell System, railroads, pub-
[fol. 7403] lic utilities, industrials and others—includes issues of $5,000,000 or over—yield based on offering price."

This exhibit contains the details graphically presented in X-236.

Exhibit X-238 is a chart entitled "Trend of averages of bond yields on re-sale, from date of issue to 1931, grouped by ratings (Moody's) on public offering."

This exhibit I believe is self-explanatory. It is a graphic presentation of the details shown on Exhibit X-239.

Exhibit X-239, consisting of three pages, is entitled "Average bond yields based on re-sale prices during each year, 1923 to 1931, inclusive, Bell System, railroads, public

utilities, industrials—based on high and low market prices of issues of $5,000,000 and over."

It contains the data on which X-238 is based.

Exhibit X-240 is a chart entitled "Trend of averages of bond yields on re-sale from date of issue to 1931 grouped by ratings (Moody's) in year of re-sale."

This is a graphic presentation of the details shown in Exhibit X-241.

Exhibit X-241, consisting of three pages, is entitled "Average bond yields based on resale prices during each year 1923 to 1931, inclusive, Bell System, railroads, public utilities, industrials—based on high and low market prices of issues of $5,000,000 and over."

This is a tabulation which contains the figures on which X-240 is based.

Exhibit X-242 is entitled "Trend of averages of bond yields on resale from date of issue to 1931, grouped by ratings (Moody's) in year of resale."

It is a graphic presentation of the data shown in Exhibit X-243.

Exhibit X-243, consisting of seven pages, is entitled "Average yield on resale of bonds 1923 to 1931, inclusive; yields on cumulative classification (according to investment rating) showing average yield in each year on all bonds of the same class issued in 1923 and in subsequent years to and including the indicated year of resale."

The heading states the subject matter. The exhibit contains the figures on which Exhibit X-242 is based.

Exhibit X-244 is a chart entitled "Trend of averages of yields of bonds issued in years 1923 to 1931, resold in each [fol. 7404] year grouped by ratings (Moody's) in year of resale."

This exhibit is a graphic presentation of the data shown in Exhibit X-245. It gives in final form the picture of the securities, and the market, for the period including 1931.

Exhibit X-245, is entitled "Weighted average yield on resale of bonds, 1923 to 1931, inclusive, showing weighted average yield on each class, including resales of all bonds issued from 1923 to year of resale—year of Resale and Yield."

This exhibit contains the figures on which the preceding chart, Exhibit X-244 is based.

Exhibit X-246 is a chart entitled "Range of averages of

bond yields on public offering price; grouped by ratings (Moody's), 829 issues, 1923 to 1931, aggregating $13,809,000,000."

The heading states the subject material. It is the graphic presentation of the data shown in Exhibit X-247.

Exhibit X-247 is entitled "Range of averages of yields on public offering price of bonds grouped by investment ratings (Moody's) 1923-1931, inclusive, showing the highest average yield on any issue within its class, and the lowest average yield on any issue within its class, based on offering price. (Includes convertible issues and issues with stock purchase warrants.)"

This includes the figures in detail which are presented in graphic form in Exhibit X-246.

Exhibit X-248 is a chart entitled "Range of averages of high and low bond yields on resale from date of issue to 1931 grouped by ratings (Moody's) in year of resale."

It is a graphic presentation of the data presented in Exhibit X-249.

Exhibit X-249 consisting of four pages, is entitled "Range of averages of high and low bond yields on resale prices grouped by investment rating (Moody's) in year of resale 1923 to 1931, inclusive, showing an average of the highest yields established during the year on all issues in each class, compared with an average of the lowest yields established on all issues in the class."

This exhibit contains the figures that are presented in graphic form in Exhibit X-248.

Exhibits X-227 to X-249 are concerned with bonds.

[fol. 7405] I have also made a study of the average yield on common stocks grouped according to Moody's investment rating of the companies' bonds, and that study is reflected in Exhibit X-250.

X-250 is a chart entitled "Public Utilities—average yield on common stocks compared with average yield on bonds grouped according to Moody's rating of the companies' bonds."

A study was made of the average yield on common stocks grouped according to Moody's Investment rating of the company's bonds. The average yield on stocks is based on the average of the high and the low market price for each year and the cash dividends paid thereon. The result is shown in graphic form in Exhibit X-250. The data on which

this chart is based are contained in Exhibit X-251. The source of this data is from Moody's Investment Manual.

Exhibit X-251 consisting of two pages is entitled "Public utilities.—Average yield on common stocks compared with average yield on bonds." This comparison includes only those companies issuing bonds from 1923 to 1931, inclusive (in amounts of $5,000,000 or over), whose stocks have been traded in open market. The stocks of these companies have been grouped according to the investment rating of the companies' bonds.

This exhibit contains the figures on which Exhibit X-250 is based.

I have also made a study of the sources of funds invested in fixed capital of public utilities operating in the City of Chicago, particularly the Illinois Bell, the Commonwealth Edison Company and the Peoples Gas Light and Coke Company, and such study is reflected in Exhibit X-252, which is a chart entitled "Source of funds invested in fixed capital—public utilities operating in City of Chicago."

I made a study of the sources of funds from various sources used by these companies. The result of the study is embodied in two exhibits, X-252, being a graphic presentation of the data shown in X-253. The sources of the data shown in these two exhibits are the records of the Illinois Commerce Commission, and Moody's Manuals. The exhibits I believe are self-explanatory.

I have furnished a copy of this exhibit to the plaintiff, [fol. 7406] and my working papers showing the details are available to the plaintiff.

Exhibit X-253 consisting of three pages is entitled "Source of funds invested in fixed capital in Illinois Bell Telephone Company." That is the exhibit which shows the detail for Exhibit X-252.

In connection with the Illinois Bell Telephone Company, I have made a further study of the source of funds invested in fixed capital, which was more extensive than the study shown in Exhibit X-252, in that it covers the period from 1913 to 1931, whereas Exhibit X-252 covers only the period from 1927 to 1931.

I obtained the figures in connection with the Commonwealth Edison Company, from Moody's Manuals, checked with the reports filed with the Illinois Commerce Commission. These are the Moody's Manual figures furnished by

the company. So far as I know, there has been no charge-off of surplus as yet.

Exhibit X-254 is a chart entitled "Illinois Bell Telephone Company—source of funds invested in fixed capital."

This includes the years 1913 to 1931, inclusive. The result of the more extensive study of the Illinois Bell history is shown in Exhibit X-255, entitled "Illinois Bell Telephone Company—entire company—investment in Fixed Capital compared with total capital obligations and surplus, years 1913 to 1931, inclusive." The data shown in both Exhibit X-254 and Exhibit X-255 were taken from the books of the Telephone Company.

Exhibit X-255 has already been described sufficiently.

I also made a study of the average funds used in the business of the Illinois Bell, the Commonwealth Edison Company and the Peoples Gas Light and Coke Company.

This study is reflected in Exhibit X-256 and Exhibit X-257. Exhibit X-256 is entitled "Average cost of funds used in business of Illinois Bell."

The data concerning the Illinois Bell Telephone Company are data taken from exhibits already presented in this case. The information concerning the Commonwealth Edison Company and Peoples Gas Light and Coke Company was taken from Moody's Manual, and checked with the reports to the Illinois Commerce Commission.

Exhibit X-257 is entitled "Average yield on bonds of Illi-
[fol. 7407] nois Bell Telephone Company and on bonds of other public utilities operating in Chicago (exclusive of transportation companies) years 1923 to 1931."

The heading states the subject matter. I might say that all of the figures thereon that relate to the yield on the Illinois Bell bonds, and of the Commonwealth Edison and Peoples Gas Light and Coke Company, were taken from Moody's Manuals. The three lines on the lower part of the sheet are a reproduction of figures appearing in Exhibit X-256, merely used here for comparative purposes.

I have also made a study, for the years 1921 to 1931 of securities issued under the authority of the Illinois Commerce Commission and its predecessor, in comparison with all public utility issues in the United States.

That study is reflected in Exhibit X-258 entitled "Securities issued under the authority of the Illinois Commerce Commission and its predecessor in comparison with all public utility issues in the United States."

This is a study which shows for the years 1921 to 1931, both inclusive, the securities issued under the authority of the Illinois Commerce Commission and its predecessor, in comparison with all public utility issues in the United States, as shown in the exhibits developed in these studies.

The issues authorized by the Illinois Commerce Commission, which are the subject matter of this study, aggregate $464,000,000. The total for the entire country including Illinois utility issues is $7,504,087,000.

My working papers showing the detail for this exhibit, are available to the plaintiff.

I also made a study of the yields on the common stock of the Bell System Companies, 1921 to 1931, as shown on the exchanges, and for the American Telephone and Telegraph Company, for the period 1901 to 1931, based on data in Moody's Investment Manual, and the results of this study are shown in Exhibit X-259, and Exhibit X-260.

Exhibit X-259 is entitled "American Telephone and Telegraph Company—Common stock—High and low selling prices and yields, 1901-1919"—page 1; and on page 2, "American Telephone and Telegraph Company—Common stock—High and low selling prices and yields, 1920-1931."

I believe it is self-explanatory.

[fol. 7408] Exhibit X-260, is entitled "Yields and average yields on high and low market prices of common stocks of Bell System Companies sold on exchanges during years 1921-1931, inclusive."

I think it is self-explanatory. The descriptive matter on the exhibit I think fully explains the contents.

Exhibit X-261, entitled "Amount of and high, low and average annual yields on all bonds of Bell Telephone system, Railroads, Public Utilities and Industrial corporations, issued in amounts of five million dollars and over, maturing in five years or more from date of issue, years 1921-1931, inclusive, issues from 1923-1931, incl., being classified according to Moody's ratings," and X-262, entitled "Statement showing all bonds of Bell Telephone System, Railroads, Public Utilities and Industrial corporations issued during years 1921-1931, incl., in amounts of five million dollars and over, maturing in five years or more from date of issue, name of issuing company, amount of issue, interest rate, offering price, high and low resale price and average annual yield," are books which contain all of the detail

underlying the Exhibits X-227 to X-260, which are being offered in connection with my testimony.

All of these Exhibits X-227 to X-226 have been very carefully checked, and I believe that they are correct.

(Exhibits X-227 to X-262, both inclusive, offered in evidence. Ruling reserved until the cross-examination.)

R. C. Rainwater, recalled as a witness on behalf of the defendants, having been previously duly sworn, testified further as follows:

Direct examination.

By Mr. Goldstein:

June 14, 1932.

In my opinion, the computations made in each of the exhibits about to be offered in evidence, X-272 to X-304, are correct, and the facts contained therein are correctly taken from the sources indicated.

Exhibit X-272, entitled "Rate of interest on capital stock installments paid by Ill. Bell to A. T. & T. converted into [fol. 7409] average return to stockholders of A. T. & T. on their investments in capital stock of A. T. & T. during years 1920 to 1930, inc.," was taken from the books of the Illinois Bell, and from Exhibit X-108 and is self-explanatory.

Exhibit X-273, entitled "Return on Investment (capital stock issued, capital stock installments and loans) from dividends on capital stock issued, interest on capital stock installments and interest on loans of Ill. Bell during years 1920 to 1930, incl.," investment in capital stock issued was taken from X-124; capital stock installments from the books of the Illinois Bell; loans from X-131; dividends on capital stock from the reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission; interest on capital stock installments from the books of the Illinois Bell; interest on the loans was computed from X-131.

Exhibit X-274, entitled "A. T. & T. Co.—Return on Investment (Capital stock issued, Capital Stock Installments, and Loans) from Dividends on Capital Stock Issued, Interest on Capital Stock installments, interest on loans, and Undivided Profits of Illinois Bell Tel. Co., during Years

1920 to 1930, inc.," is computed from X-273, with the addition of the undivided profits which were computed from the annual reports of the Illinois Bell to the Illinois Commerce Commission, and allocated to the American Telephone & Telegraph Company on the basis of stock ownership.

Exhibit X-275, entitled "A. T. & T. Co.—Percentage of Undivided Profits, Allocable to A. T. & T. Co. Stock Ownership, to investments by A. T. & T. Co. in Common Stocks of Licensee Companies, during years 1920 to 1930, incl.," was taken from pages 300 and 301 of the annual reports of the licensee companies to the Interstate Commerce Commission and allocated to the investments of the American Telephone & Telegraph Company in the stocks of the various companies on the basis of the stock ownership, computed from X-124.

Exhibit X-276, entitled "A. T. & T. Co.—Percentage of Undivided Profits of Licensee Companies to investments by A. T. & T. Co. in common stocks of Licensee Companies, converted into Average Return to Stockholders of A. T. & T. Co. on their investment in Capital Stock of A. T. & T. Co. during years 1920 to 1930, incl.," was computed from X-275 and X-108.

[fol. 7410] The source of X-277, entitled "A. T. & T. Co.—Percentage of Dividends and Undivided Profits of Licensee Companies to investments by A. T. & T. Co. in common stocks of Licensee Companies, during years 1920 to 1930 inclusive," was X-275, and the dividends were taken from the annual reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission.

Exhibit X-278, entitled "A. T. & T. Co.—Percentage of Dividends and Undivided Profits of Licensee Companies to Investments by A. T. & T. Co. in Common Stocks of Licensee Companies, Converted into Average Return to Stockholders of A. T. & T. Co. on their investments in capital stock of A. T. & T. Co. during years 1920 to 1930, incl.," was computed from X-277 and X-108.

Exhibit X-279, entitled "A. T. & T. Co.—Percentage of Undivided Profits Allocable to A. T. & T. Co. stock ownership to investments (Stock and Loans) by A. T. & T. Co. in Licensee Companies during years 1920 to 1930, inclusive," was computed from X-275 and X-131.

Exhibit X-280, entitled "A. T. & T. Co.—Percentage of Undivided Profits of Licensee Companies to Investments (Stocks and Loans) by A. T. & T. Co. in Licensee Compa-

nies, converted into Average Return to Stockholders of A. T. & T. Co. on their investments in capital stock of A. T. & T. Co., during years 1920 to 1930," was computed from X-279 and X-108.

Exhibit X-281, entitled "A. T. & T. Co.—Percentage of Dividends, Interest, and Undivided Profits of Licensee Companies to Investments (Stock and Loans) by A. T. & T. Co. in Licensee Companies, during years 1920 to 1930," was computed from X-278, X-280 and X-131.

Exhibit X-282, entitled "A. T. & T. Co.—Percentage of Dividends, Interest, and Undivided Profits of Licensee Companies to investments (Stock and Loans) by A. T. & T. Co. in Licensee Companies, Converted into Average Return to Stockholders of A. T. & T. Co. on their investments in Capital Stock of A. T. & T. Co., during years 1920 to 1930, inclusive," was computed from X-281 and X-108.

In X-283, entitled "A. T. & T. Co.—Dividends on Capital Stock and Undivided Profits Allocable to A. T. & T. Co. Ownership Related to Investment in Capital Stock and Surplus allocable to A. T. & T. Co. ownership of Ill. Bell Tel. [fol. 7411] Co., of all Licensee Companies, and of all Licensee Companies Exclusive of the Ill. Bell Tel. Co., during years 1920 to 1930, incl.," the dividends were taken from the annual reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission; the undivided profits were taken from X-275; the investment in capital stock was taken from X-124; the corporate surplus was taken from page 300 of the annual reports of the licensee companies to the Interstate Commerce Commission and was allocated to the American Telephone & Telegraph Company on a basis of stock ownership indicated in X-124.

Exhibit X-284, entitled "A. T. & T. Co.—Return on Investment (including Surplus) in Ill. Bell Tel. Co., in All Licensee Companies, and in All Licensee Companies exclusive of Ill. Bell Tel. Co. during years 1920 to 1930, incl.," was taken from X-283 and X-131, and the information as to the capital stock installments was taken from the books of the Illinois Bell.

Exhibit X-285, 28 pages, is entitled "American Telephone & Telegraph Company—Excess of Return to A. T. & T. from Investment in Illinois Bell Telephone Company over Average Return from Investment in Other Licensees, showing Excess of Dividends, of Interest on Loans,

of Interest on Capital Stock Installments, and of Undivided Profits."

Exhibit X-286, entitled "American Tel. & Tel. Co.—Percent of Undivided Profits and Dividend Payments to Capital Stock during years 1920 to 1930, incl.," shows the earnings on the average capital stock of the American Telephone & Telegraph Company as shown in the annual reports of the American Telephone & Telegraph Company, to its stockholders and the Bell Telephone Securities Manual, broken down into the per cent of earnings paid out in dividends and the undivided profits applicable to such stock, excepting that in X-286 there is also taken into consideration the amortization charges which the American Telephone & Telegraph Company has charged to surplus, but which Mr. Heiss in his statements of the cost of funds included as an expense. The figures in column 1 were taken from X-105. Capital stock and dividend rates were taken from X-108. The computations are self-explanatory.

Exhibit X-287, entitled "A. T. & T. Co.—Return on Funds used in Business, years 1920-1930, incl.," consisting of two sheets, is a combination of A-164 which shows the annual cost [fol. 7412] of funds, that is, the annual amount of earnings paid out by the American Telephone & Telegraph Company, plus the undivided profits, related to the funds used in the business.

It was taken from X-108 and X-286.

Exhibit X-288, entitled "A. T. & T. Co.—Summary of Capital Stock outstanding, during years 1920-1931, incl.," was taken from the Annual Reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission.

Exhibits X-289, entitled "A. T. & T. Co.—Changes in Capital Stock Outstanding since 1922," shows the changes in the capital stock outstanding since 1922, and shows the character of the transactions resulting in the sales.

The sources of this were Standard Statistics (Bulletin A-37 Revised of American Telephone & Telegraph Company), Annual Reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission and data furnished by the American Telephone & Telegraph Company.

Exhibit X-290 entitled "Percent of Undivided profits and Dividend Payments to Capital Stock Long Lines Division during the years 1920 to 1930, inclusive" shows the per

cent of the undivided profits and dividend payments, related to capital stock allocated to Long Lines Division, on the basis of X-104, furnished by the American Telephone & Telegraph Company with the addition of the amortization charges to surplus which were added to conform to the total charges shown in X-108.

The Annual Reports of the American Telephone & Telegraph Company to the Interstate Commerce Commission and to the Illinois Commerce Commission do not show the revenues and expenses of the Long Lines Department apart from the other operations of the American Telephone & Telegraph Company.

The income and expense statement of the American Telephone & Telegraph Company, as a whole are shown in the Annual Reports to the Interstate Commerce Commission, and a footnote appears in connection with these statements in the language as follows:

"This company, in addition to conducting long distance telephone operations, maintains a general financial and administrative organization for the benefit of the Associated Bell Companies. The foregoing revenue schedule, therefore, [fol. 7413] includes, in addition to telephone operating revenues, revenues received under license contracts, under which instruments, and financial, engineering, commercial, legal, accounting, and other services are furnished to such associated companies. The expense schedule includes all the expenses, classable under those accounts, incurred in connection with such activities. For this reason any operating ratio shown in this schedule would be without significance and would not be comparable with that of a company whose activities are confined strictly to telephone operations."

I have another exhibit to be offered as X-301, which shows the return on fixed capital investment in the Long Lines.

"Q. X-291, entitled 'A. T. & T. Co.—Percent of Undivided Profits and Dividend Payments to Capital Stock—Holding Company during years 1920 to 1930, incl.,' consists of two sheets, and is the return to the American Telephone & Telegraph Company stockholders resulting from the Holding Company operations which Mr. Heiss has shown in X-104. The data which does not appear in X-104 came from X-108, is that correct?

A. That is true."

Exhibit X-292, entitled "A. T. & T. Co.—Percent of Undivided Profits and dividend payments to Capital Stock—License Contract Division during years 1920 to 1930, incl.," consisting of two sheets, shows return to the American Telephone & Telegraph Company stockholders resulting from license contract operations, as shown in X-104. The data which does not appear in X-104 came from X-108.

Exhibit X-293, entitled "A. T. & T. Co.—Investments in Capital Stock of Western Electric from Nov. 17, 1915, to Dec. 31, 1930," shows X-99 translated into return to the American Telephone & Telegraph Company's stockholders, and also includes the return on the American Telephone & Telegraph Company's holdings in preferred stock. It shows the return to the American Telephone & Telegraph Company on its investment in stock in the Western Electric Company. The data from which this exhibit was computed is shown in X-294, except as indicated in the footnote.

Exhibit X-294, entitled "A. T. & T. Co.—Return on Investments in Capital Stock of Western Electric, during years 1916-1930, incl.," was taken from the records of the American Telephone & Telegraph Company.

[fol. 7414] Exhibit X-295, entitled "Western Electric Company—Return to Stockholders on Capital Investment," consisting of twenty pages, shows the return from dividends on stock of the Western Electric to the Western Electric investors, including the American Telephone & Telegraph Company, on the basis of cash put into the Western Electric. The data shown in X-295 was taken from City's Exhibit 59, appearing in record volume VI, pages 2064 to 2067, and also from the Annual Reports to the stockholders of the Western Electric Company, Inc., from 1916 to 1930, and also from the Annual Reports to the stockholders of the Western Electric, an Illinois corporation, from 1909 to 1915, inclusive, from D-77 and from a certified copy of the articles of incorporation of the Western Electric, Inc., and the amendments thereto. In connection with these sources, it is important to note the amendment to the Articles of Incorporation of September 29, 1925, which contains the following:

"The capital of the corporation shall be at least equal to the sum of the aggregate par value of all issued shares having par value, plus $5 in respect of every issued share without par value, plus such amounts as from time to time, by resolution of the Board of Directors, may be transferred

thereto, and such capital shall be not less than $52,500,000.00."

Column 3, entitled "Shares of Bonus Stock Outstanding," represents the two thousand shares stated in record, Volume VI, page 2067, to have been acquired by the American Telephone & Telegraph Company as a result of the transaction by which the Western Electric received the manufacturing contract of 1882, and the stock dividends thereafter declared applicable to such stock. The other columns are self-explanatory. For the period 1916 to 1930, Average Annual Return to the company's investors on all capital stock issued is treated on two bases.

Basis 1 is shown on page 3, and basis 2 on page 14. The necessity for using two bases arises from the fact that in November, 1915, the American Telephone & Telegraph Company and the minority stockholders exchanged 150,000 shares of par value common stock for 150,000 shares of preferred stock redeemable at $120 per share plus 150,000 shares of no par value common stock.

In 1917, 150,000 additional shares of preferred stock were issued which was redeemable at $120 per share.

[fol. 7415] In 1920 the 300,000 shares of preferred stock were retired at $120 per share, and at the same time 200,000 shares of new common stock was issued to the same stockholders at $180 per share.

Basis 1 treats the retirement of the preferred stock as a distribution of cash, and the subscription to the common stock as a separate transaction.

Basis 2 treats the retirement of the preferred stock at $120 a share and the subscription to the common stock at $180 a share as an exchange of one share of preferred stock for two-thirds of a share of common stock. Page 19 shows the earnings available for the common stock as shown in the annual reports of the Western Electric Company related to capital and surplus.

The other sheets of this exhibit show the return from the dividends on the investment of the stock investors in the various issues from 1916 to 1930. They also show the extent to which the dividends paid out by the Western Electric for the period 1916 to 1930 came from current earnings, or earnings accumulated prior to the organization of the company in 1915.

Exhibit X-296, entitled "A. T. & T. Co.—Percents of re-

turn on investment from all operations—classified during years 1920 to 1930, incl.," was computed from X-286, X-290, X-291, X-292, X-294, X-284 and X-145.

It shows the per cent return on investment from all operations, classified, and compares the return of the Illinois Bell with that of other licensees. It shows the break-down of the return on entire company transactions, as shown in X-287, into the return from various classes of operations of the American Telephone & Telegraph Company. Items 1, 4 and 5 are the main divisions making up item 6. Items 2 and 3 are subdivisions of item 1.

Exhibit X-297, two sheets, entitled "A. T. & T. Co.—Percents of return on Capital and Surplus from all operations—classified during years 1920 to 1930, incl.," shows the conversion of X-296 into a return on capital and surplus.

Exhibit X-298, entitled "A. T. & T. Co.—Percent of return on capital stock from all operations—classified during years 1920 to 1930, incl.," shows the conversion of X-296 into a return on capital stock.

[fol. 7416] Exhibit X-299, entitled "A. T. & T. Co.—Percentages of Return of Licensee Companies on Average Fixed Capital and Materials and Supplies, years 1920 to 1930, incl., and year ended Dec. 31, 1931," is self-explanatory, and was prepared from the sheets of each of the annual reports of each of the licensee companies to the Interstate Commerce Commission, entitled "Comparative General Balance Sheet, Income Account, Telephone Operating Revenues, and Telephone Operating Expenses."

Exhibit X-300, entitled "A. T. & T. Co.—Percentages of Return of Licensee Companies on Average Fixed Capital and Materials and Supplies, less Average Accrued Depreciation years 1920 to 1930, incl., and year ended Dec. 31, 1931," is two sheets prepared from the same source as X-299, and is self-explanatory.

Exhibit X-301, entitled "Comparison of Revenues, expenses and return on investment in Long Lines years ended Dec. 31, 1920 to 1930, incl.," was taken from X-207, X-208, X-104, X-105, and from the records of the American Telephone & Telegraph Company.

This exhibit shows the return on the fixed capital, material and supplies for Long Lines Department, and is the exhibit to which I referred in connection with my earlier exhibit of the Long Lines, investment represented by capital stock and surplus.

Exhibit X-302, entitled "A. T. & T. Co.—Return on Fixed Capital, including General Equipment for Ill. Bell Tel. Co., for all Licensee Companies, and for all Licensee Companies Exclusive of Illinois Bell Tel. Co. years 1920 to 1931," was prepared from X-299 and X-300, and is self-explanatory.

I made a comparison of the per cent of return on the fixed capital of the licensee companies, as shown in Exhibit X-302 and as shown in the American Telephone & Telegraph monthly statistical report CR-51-A, for the years 1920 to 1931.

Exhibit X-303, entitled "A. T. & T. Co.—Comparison of percent of return on fixed capital of all Licensee Companies, as shown in Exhibit X-302 and as shown in A. T. & T. Co. monthly statistical report of C. R. 51-A, years 1920 to 1930, inclusive, and year 1931," shows the comparison and shows the difference between the two.

The CR-51-A reports were not made available to me until after the taking of the depositions in New York in De- [fol. 7417] cember, 1931, and the MR reports underlying CR-51-A were not made available until May, 1932.

(Counsel for defendants states that on September 8, 1931, Mr. Goldstein made the request of Mr. Heiss to make available M. R. reports Nos. 1, 2 and 3 for each of the Associated Companies, for each year, 1923 to 1930, inclusive, and that refusal was made by letter of Mr. Bracelen, dated September 22, 1931.

Counsel for plaintiff states that counsel for defendants thereafter made application to the court for leave to see those reports; that was argued before a full bench, and the motion was denied. That later the plaintiff used certain information from these reports, and that defendants insisted upon their right to see them, and that after long argument plaintiff finally, in order to avoid having any technical question arise on which there might be a reversal after this prolonged trial, allowed them to see everything they wanted to see and to copy everything they wanted to copy.)

With the use of CR-51-A reports, M. R. reports and CR-64-A, from which the data in CR-51-A reports was compiled, or could be checked, or was a basis of check, I would have been able to make the comparison shown in Exhibits

X-299, X-300 and X-302 without the necessity of making the computations from the Interstate Commerce Commission reports.

The information was taken from certain pages of the annual reports to the Interstate Commerce Commission, of the licensee companies, and it took two men approximately six weeks to work out the entire statement.

I checked the figures shown in X-302 with the figures shown in C. R. 64-A, which was made available to me on May 23, 1932.

I checked the total plant in service as of June 30, for the years 1923 to 1931, inclusive, with the average fixed capital shown in X-302 and found the following per cent of differences:

1923, 4.31 per cent; 1924, 4.44 per cent; 1925, 4.40 per cent; 1926, 3.94 per cent; 1927, 1.83 per cent; 1928, 2.90 per cent; 1929, 3.13 per cent; 1930, 1.85 per cent; 1931, 2.20 per cent. This per cent of difference was the excess of the figures shown in X-302 over the average plant in service [fol. 7418] shown in C. R. 64-A, the differences being due partly to the fact that our figures included general equipment, while the figures shown in C. R. 64-A did not.

The computations which I made from the Interstate Commerce Commission reports were from the four sheets which I have mentioned, and involved the use of seventeen hundred odd sheets, which are exhibited in the court.

I did not have all of the annual reports, I just had those four sheets which were sent to me by the Interstate Commerce Commission.

I made a comparison of the per cent of return on fixed capital of the Illinois Bell, as shown in X-302, and as shown in the Illinois Bell monthly report for the years 1922 to 1931, inclusive.

The result of the comparison, the differences, and the explanation of the differences is shown in Exhibit X-304, entitled "A. T. & T. Co.—Comparison of Per Cent of Return on Fixed Capital of Ill. Bell Tel. Co. as shown in Exhibit No. X-302 and as shown in Ill. Bell Tel. Co. Monthly Report No. 1, years 1922 to 1930, inclusive, and year 1931."

(Exhibits X-272 to X-304 offered in evidence. Ruling reserved until after cross-examination.)

* * * * * * *

[fol. 7419] R. C. RAINWATER, recalled as a witness on behalf of the defendants, having been previously duly sworn, further testified as follows:

Cross-examination.

By Mr. Blackman:

June 15, 1932.

I stated on direct examination that I had spent six weeks, or some substantial period of time, in examining the reports of the Bell System Companies and the American Telephone & Telegraph Company to the Interstate Commerce Commission. That is I examined only part of those reports; I stated that I had certain pages of those reports I believe in my testimony yesterday; I did not have all of them. I think we started on that examination about the first or second week of October, 1931. It took about six weeks to make it.

We examined certain schedules, called the comparative general balance sheet, income account, telephone operating revenues, and telephone operating expenses, of the companies that were listed I believe in X-299. I do not recall that we examined the report of the American Company in connection with that examination. I would not have to go to Washington for that. It is made to our Commission annually. A copy of what is filed with the Interstate Commerce Commission is filed with our Commission annually; that is the Interstate Commerce Commission's printed form [fol. 7420] is submitted to us with a little paster on the outside with the Illinois Commission's name on it.

I don't know how many pages of exhibits have been submitted by me in the last two or three days. I have not counted them. There would not be as many as one thousand; about 200 I would say. There are about eighty exhibits and some of them are on one page, and I believe the largest was 28 pages, according to my recollection.

As to the source of these exhibits: I think my testimony will show that I used the annual reports to the stockholders of the Western Electric Company; these pages that I have referred to of the Interstate Commerce Commission's reports; the report of the American Telephone & Telegraph Company to the Illinois Commerce Commission; the various documents which were offered in the previous hearings as City's Exhibits, and which were fur-

nished by the Company; the exhibits of Mr. Heiss in the Ohio case, and the underlying papers connected with that case; sheets that were furnished to me; which were prepared in a similar manner for other years, to those sheets offered in the Ohio case; and in some few instances figures taken from the books of the Illinois Bell Telephone Company. There might have been others. I do not think I can make any general statement that will cover every item. I do not think that I had all of these sources of information in October, 1931. I cannot answer definitely which sources of information we had in October, 1931.

"Q. Can you name a single document, or a single piece of information which you obtained subsequent to Jan. 1 of this year, which you have used in any way in any of these papers which have been offered in evidence on your testimony in the last two or three days?

A. I obtained some of the information from the Illinois Bell Telephone Company since January first."

I presume that all of the books of the Illinois Bell Telephone Company have been open to us at all times. I have never asked for any of their records that I have not received.

I remember that there were some other documents that I obtained since January 1 in connection with these exhibits. I obtained the copies of the Interstate Commerce Commission reports, for the year 1931, only recently, in [fol. 7421] connection with some of the other documents that I used that were furnished by Mr. Heiss.

I cannot remember whether I obtained the documents furnished by Mr. Heiss before January 1st, or since. With the volume of work I have done, it would be impossible for me, without giving some study to it, to determine just the exact date the documents were received. Our work papers may show that. I don't remember. There were some other documents received after January 1st. Some of them are the C. R. 51-A report for the year, 1931. I just received that within the last week or so, and the Exhibits X-299 and X-300 were checked in this respect; that my average plant figures were checked against your M. R. reports, that I inspected here in the court the latter part of May. Those are the M. R. and C. R. reports about which there was so much discussion. I checked them the latter part of May.

I used Exhibit 51-A to check my figures against it, but

I made up these figures before I saw 51-A. Most of these figures in these exhibits were not made up by me last year. We have been working on them since the first part of October, up to the date that they were turned over to the plaintiff for inspection. Some of them I completed. I would not say that most of these sheets that I have offered here were completed last year. I haven't kept any record as to when these sheets were completed, and I would not attempt to answer the question.

"Q. Well, now, you say that you used the M. R. and C. R. reports to check. Your examination of these Interstate Commerce Commission records showed you that all of the information necessary to check any of Mr. Heiss' exhibits, or ratios, and any of the ratios put in by Mr. Crunden were all contained in those Interstate Commerce Commission records, did it not?

A. I don't believe the information as to the average employees was in the Interstate Commerce Commission reports. I don't believe the information as to the estimated requirements was in the Interstate Commerce Commission reports. I don't believe the information as to the provisional estimates was in the Interstate Commerce Commission reports.

Q. Well, now, neither Mr. Heiss nor Mr. Crunden used [fol. 7422] the provisional estimates in developing any of these ratio figures, did they?

A. They used C. R. 13, and the provisional estimates are the underlying documents for C. R. 13."

Mr. Heiss used the C. R. 13's in connection with his Exhibit A-169. The ratios he used had to be developed from the figures he used. He developed his ratios on holding funds available, the ratios he had to use to prorate the losses to Chicago, to the Associated Companies, to Long Lines. I don't know of any other ratio that he developed from C. R. 13. I had the C. R. 13's prior to the time that I put in these exhibits.

I could not answer whether I had the C. R. 13's prior to January 1st of this year. I don't know. I don't remember any particular delay or difficulty in connection with getting the C. R. 13's. I know I had them at the time I prepared one of my exhibits, but the exact date I received the form I cannot remember now. They were furnished to us by the American Telephone & Telegraph people. I think

counsel made the request for them. I don't recall any particular difficulty that I had in connection with getting it.

The figures showing 7.42 per cent for the Illinois Bell Telephone Company for the year 1929, on Exhibit X-133, were obtained from X-132, and show a profit over and above the cost of funds of eighty-nine hundredths of one per cent; by adding the eighty-nine hundredths of one per cent of profit to the cost of funds of 6.53, the total of the two items is 7.42, shown on X-133.

The figure of interest on loans paid by the Illinois Bell Telephone Company to the A. T. & T. Company, shown on X-132, goes back to my Exhibit X-131. Somewhere along the line, in order to get this figure shown in Exhibit X-133, I had to develop the interest on loans, not only in connection with the Illinois Bell Telephone Company, but the other companies. They are all worked out on the same basis.

I haven't the figures here showing what the Illinois Bell Telephone Company paid to the A. T. & T. Company for funds during the year 1929. As near as I can compute it, it would work out on the basis I have used, about 5.54 per cent.

[fol. 7423] Exhibit X-284 shows how much money the Illinois Bell Telephone Company paid to the American Company in the year 1929 as interest on advances. That is the figure I used on that exhibit to represent the payments by the Illinois Bell to the American Company for advances by the American Company to the Illinois Bell in that year. Those figures for each of the years 1923 to 1930, inclusive, are as follows:

1923	$11,280	1924	
1925	134,388	1926	$394,605
1927	221,625	1928	271,801
1929	686,659	1930	32,037

The figures shown in X-133, came from X-132, X-131 and X-128. Exhibit X-131 shows the losses on the loans made to all the licensee companies, including the Illinois Bell. The Illinois Bell losses that I show for each of the years 1923 to 1930 were prorated on the basis of the average loan shown on City Exhibit 142. The loss to the A. T. & T. Company for furnishing "temporary advance" for the year 1929 to the Illinois Bell Telephone Company, I put down as $123,876.75. That loss represents the difference between what the money cost the A. T. & T. and what the A. T. & T.

got. $686,659 is the figure that is shown on X-284 as the amount paid to the A. T. & T.

Referring to the report of the Interstate Commerce Commission, which I say is one of the documents that I used, the interest payments in the year 1929 show a figure in respect to the Illinois Bell of $455,545.33.

I don't think that figure represents the same thing that I was using the six hundred and some odd thousand dollars for. The difference is probably due to the average loans that I used which were furnished to me by the company in connection with Exhibit X-142.

Some of the amounts which I have used in these exhibits as coming from the reports are not direct figures but are derived figures. The six hundred and some odd thousand dollars that I used for 1929 is a derived figure using the figures the company furnished me. The company furnished me with the average loans to the Illinois Bell, which I have used. They furnished me with the loss on the loans which I have used. They furnished me the rate of cost of funds [fol. 7424] which I have used; all were computed from figures they furnished me. I don't think they furnished any rate for the use of funds, but it may be readily computed from the figures they furnished me to be 5.54.

I did not know that the rate which was used over that entire period with respect to the advances of the American Company to every company of the Bell System was the same 5.88, without change. That rate of 5.54 is a simple computation from the figures they furnished me. I am referring to the average loans, the losses on the loans in dollars which were furnished; and they furnished the rate as to the cost of funds, and I used those combined, the three factors to get the interest received.

"Q. Did they furnish you with the information you asked for with respect to these particular matters?

A. We asked for the average loans, and they furnished those figures to us. Now, what method they used of averaging them, I did not go into that. I accepted them as they furnished them."

For the average loans for the year 1929 to all licensees, I have $245,788,267. For the Illinois Bell it was $12,412,500. It is shown on City Exhibit 142. These average loans came to me through counsel, and I assumed that they were furnished by the company. The heading in City Exhibit 142

shows average loans to each licensee company. Then in parentheses here are the words:

"Dividing the sum of the loans outstanding on the first day of January, April, July and October, by four."

I think that that information was furnished as a result of a request to the company to bring down Exhibit 142, to date. The use of those figures in the manner in which I have used them would require, for their accuracy and the reasonableness of such use, that the loans which were in existence at any date taken were the average for the entire quarter. I have some figures here before me that my working papers show that the City Exhibit 142 figure was what I just said. I have it in total for all the companies. I have it for the Illinois Bell. And the monthly average for all loans was $254,234,480, while the quarterly average was $245,788,267.

(Document marked Plaintiff's Exhibit A-218 for identification.)

[fol. 7425] If the loans were actually as indicated on Exhibit A-218 for identification, I cannot tell whether the use of the quarterly averages in the manner in which I have used them would give a figure far in excess of the average outstanding loans because I cannot tell anything about this exhibit as to what the average might be. I did not have the figure shown on Exhibit A-218 for the July 1st quarter. That had to be used to work out City Exhibit 142, which the Company furnished. I haven't the details back of City Exhibit 142, and that is what I would have to have to tell the amount of the loans as of July 1st.

This Exhibit A-218 shows the daily balance of advances and I would not undertake to give what the average was of those figures for the year 1929. Taking the amounts quarterly and dividing by four, would take in the July quarter at a figure of $20,000,000 as it appears to me, from the way the chart is made up. I don't know whether or not that was paid off the next day. Assuming the correctness of the chart that appears to be true. The way in which I have used the figures would presuppose that the $20,000,000 remained outstanding for the rest of the quarter, as to the amount of the principal, but as to the rate, it is a little different when we consider the way I have worked it out. I gave you a figure that worked out to 5.54. You say the rate was 5.88 in that year. That is the extent of the variation, using

this method of averaging as compared to an actual daily average. I think the figure of 5.88 is correct.

"Q. Now, assuming that 5.88 was the rate, and assuming the correctness of those figures, those figures that are set forth in the Interstate Commerce Commission report of four hundred and fifty-five thousand some hundred dollars, you could get the average from those two figures, couldn't you, the average loans?

A. If the interest figures that you showed me on the annual report represent all interest received in loans during the years——

Q. Yes.

A. From the Illinois Bell by dividing by the rate of 5.88 for the average loans could be worked out, but I don't know of my own knowledge that the other companies had all paid exactly 5.88 rate. I did not assume that at all.

[fol. 7426] Q. So, then, you undertook to compare the profits of the A. T. & T. and the financial standing and record of the Illinois Bell with other companies, using these loan payments without knowing whether they were all paying the same rates, is that a fact?

A. I assumed that they paid the same rate, but I do know——

Q. You just said you did not know whether they were paying the same rate, and that is the reason you did not use that.

A. I had no knowledge of my own they were paying a rate of 5.88, because I did not have access to the books of the other companies.

Q. Answer this question directly:

Would you, as an accountant, undertake to do what you have done in these papers, and would there be any justification for it whatever if the companies were not paying exactly the same rate on their loans?

A. That assumes that they were paying the same rate——

Q. No, answer my question, please.

A. Read the question.

Mr. Blackman: Read the question to the witness.

(The pending question was thereupon read.)

The Witness: In prorating these losses on an average——

Q. No. Please answer the question.

A. I don't know any other way to answer it.

Q. My question asks for an answer yes or no. Please give it. Read the question again, please, Mr. Stenographer.

The Witness: Read it again.

(The pending question was thereupon re-read.)

The Witness: No, it would not be justified unless they were paying the same rate, and I assumed that in these calculations."

I cannot say of my own knowledge I knew it. I knew the rate was 5.88 in respect to the Illinois Bell, and I assumed that the others paid the same rate. I made up the figure of 5.54 per cent based on my computation of the average of the Bell System loans for the year 1929. There is a slight error in this figure due to the method I used of averaging the loans.

"Q. Yet, you have compared those figures, which show slight increases and slight decreases with what you call [fol. 7427] the cost to the American Company of money, and worked out figures which show that the Illinois Bell is doing two thousand per cent better than other companies, in some cases, based on these very figures and differences of fractions, isn't that a fact?

A. These companies were all on the same basis of 5.54. They are all on the same basis."

It would amount to my putting them all on the 5.54 basis, so there is no variation in it there as between companies.

I don't see how it could work any variation. They are on the same basis, all on the same basis of 5.54. That is the effect of my computations. I am comparing what they paid with the amounts it cost the American Company.

"Q. And then you take that amount and you combine it with the dividends, and you compare it with other amounts, and you are using these figures which are theoretical figures and incorrect in connection with figures that are actual and real, aren't you? And in which the same error does not occur?

A. Why, I have combined these figures with other figures of return.

Q. Figures that are definite?

A. If that is what you mean——

Q. Figures that are definite and accurate, and you have worked out percentage relationships. Now, don't you know that would be bound to get a wrong result?

A. Well, of course, to whatever extent the average loans, as I have used them, were in error, why, it would affect the final result to some extent; I don't know just how much."

I don't know whether it is a fact that is an error of $5,000,000 or forty or fifty or sixty per cent in the figure of average loans which I used for the year 1929 would make any difference in the result.

If that were shown to be the fact, I cannot say what effect it would have on the calculations, of combining various items of investments and various items of return—there are large amounts involved here, and I would not undertake to say what the effect would be in a matter of that kind.

"Q. Won't you work out for me, briefly—I don't think it will take more than a half a minute—the correct figures [fol. 7428] for the year 1929? We have from the Interstate Commerce Commission report this figure that I have shown you here, as 5.5—$455,543.33. Now, you know the rate was 5.88. Now, as an accountant, I should think you could figure that in about thirty seconds, and tell me what the average loans were?

A. I don't think I ought to be asked to make computations on the witness stand.

Mr. Blackman: I ask the Court to instruct and direct the witness to make the simple computation.

Judge Wilkerson: You make it.

Mr. Blackman: I would like to have him figure it. If he cannot do a simple sum like that, it certainly bears on his competency."

This calculation results in a figure of $7,747,364 as the average loans. The average loans for the year 1929, which we used, is $12,412,500, as shown on City Exhibit 142. The average loans for each of the years 1923 to 1930 can be obtained by dividing the interest payments during each year by 5.88, assuming that the facts as shown in the reports are correct.

(Counsel asks the witness to take down the following figures and check them and report later whether the figures stated by counsel to be correct are correct.)

Year	Witnesses Figures From City Exhibit 142	Stated by Counsel to Be Correct
1923	$200,000.00	$411,394.00
1925	2,317,041.00	1,983,044.00
1926	6,874,656.00	7,511,837.00
1927	3,750,000.00	811,803.00
1928	4,575,776.00	5,321,803.00
1930	550,000.00	12,228.00

"Judge Wilkerson: You mentioned those two figures, 5.88—you spoke of it as something that is generally and thoroughly understood?

Mr. Blackman: Yes, it is thoroughly known throughout the Bell System that that is the rate that has always been charged and is always charged to this company, and to every other company in the Bell System.

Mr. Blackman: If we assume that some of these companies are not paying any rates of interest, that some of [fol. 7429] them are not taking advantage of the discount and are paying the full six per cent, and that the rates which are not paid by some are loaded on others, what effect would that have as to the validity of the comparison? You are seeking to make an Exhibit X-131 and subsequent pages——

The Witness: I don't know just what you mean as to the validity of them.

Mr. Blackman: Please, repeat the question to the witness. I think I am using very simple English language.

(The pending question was thereupon read.)

A. It would affect the exhibits to whatever extent there was a variation from that rate.

Q. As an accountant, you could just throw them out of the window, couldn't you, if that were the fact, is that right?

A. I would not say that."

I certainly would not back exhibits that were not correct. I don't think that the variation in the interest rate paid by these companies that I purport to compare, destroys all the validity of the comparison. It would impair the validity of it to whatever extent the error enters into it and the result is affected.

"Mr. Blackman: Well, the slight impairment of the validity of a figure or two, where you are comparing it with a

figure of 2.2 in order to develop a percentage, may result in very varying amounts, may it not?

A. What is the question?

Mr. Blackman: Read it.

(The pending question was read.)

Mr. Blackman: In widely varying amounts?

A. I don't recognize 2.2 that you are talking about.

Q. I am just taking it for an illustration.

A. It would depend on the amounts, and on the factors involved. I cannot answer your question."

The figure 59.53 per cent in the last line of Exhibit X-111, which is "Per cent of return on investment expressed in per cent of return to A. T. & T. Company stockholders on their average capital stock investment," is a mathematical computation using Exhibit X-108, and using a mathematical formula to convert the figure over to return to stockholders on their portion of the investment.

[fol. 7430] This is what I did: Taking the figure 39.02, shown on X-111, and referring to X-108, there is shown that the average cost of funds for the year 1923 was 6.87 per cent. That is the average cost of money to the A. T. & T. on the funds that it procured from the various sources shown in X-108. I subtracted 6.87 from 39.02, which leaves a per cent of 32.15. The next step, I divided 100 per cent by 63.39, also shown on X-108, and I get a figure of 1.5775358.

The figures I divided by are shown on sheet X-108.

I divided 100 per cent by 63.39. They are both shown. I got 1.5775358. Now, multiplying 32.15 by 1.5775358, I should get 50.74. I haven't the details here before me, but that is what it should work out to. Then I add to that the dividend rate which is included in the average cost of funds, and I get 59.53 per cent. That is the mathematics of it, the way it is worked out.

In line 5, I developed a percentage figure which I call per cent of return on investment, and that is 39.02 per cent. Then, I stepped that up to 59 per cent plus, which I say is the per cent return on investment to the stockholders of the A. T. & T., by deducting the 9 per cent dividend which the stockholders received, plus the combined interest and other things which average out about 6.87, from 39.02, then by applying other figures and adding back the dividend, I get a yield to the stockholders of the A. T. & T. of 59.53 per cent.

"Mr. Thompson: Before the record is closed, I have something I should like to appear of record. Your Honor will remember that a day or two ago there was quite an extended discussion in court about the balance sheet of the Graybar Electric Company for the years 1929, 1930 and 1931.

I have no doubt your Honor remembers it, I have no doubt your Honor remembers that from the end of 1928 the employees of the Graybar, the Graybar management, have owned that corporation.

Judge Wilkerson: Yes, I remember it.

Mr. Thompson: And that the Western has a participating preferred stock. Now, since the adjournment of court, although it has been our thought all the time that we were under no obligation to furnish these figures, and that they have no relation to this controversy, I obtained and I now offer in open court a balance sheet of the Graybar Electric [fol. 7431] Company for the year 1929, one for the year 1930 and (a) one for the year 1931, together with a certificate under the seal of the assistant secretary to the method in which the accounting records of Graybar are kept, so far as relating to property of telephone apparatus, lead-covered cable and supplies is concerned.

Mr. Goldstein: Does that include all of the information that we asked for?

Mr. Thompson: I offer it to you, this is what we have obtained from Graybar, a corporation we do not own, and in which we have an interest as a participating preferred stockholder.

Now, here it is. If you want it, it is available. If you don't, you may use your own pleasure about it.

Mr. Goldstein: Excepting, Mr. Thompson, as my eye glances over this document, it contains more information than the assets and liabilities, it contains profits and losses.

Mr. Thompson: Well, it is a balance sheet.

Mr. Goldstein: Yes, but it shows profits and losses, which is entirely different than a balance sheet.

Mr. Thompson: Is your objection that we have furnished too much?

Mr. Goldstein: No, it is not. I am asking you whether (b) you are offering the profits and losses, or only the balance sheet? You stated you had a balance sheet. I am asking you whether you are offering the whole sheet, with all of

the figures, or only that portion of it which has to do with assets and liabilities.

Mr. Thompson: I am not offering it. I have produced it in court for your information.

Judge Wilkerson: He produces it so you may offer it if you wish.

Mr. Goldstein: He referred to assets and liabilities, and I wondered whether, in view of the previous limitations, we are limited to looking at the lines marked assets and liabilities, or whether we can look at the whole thing.

Judge Wilkerson: Yes, Court and counsel are free to examine it all.

Mr. Haight: We acknowledge receipt of the document, and will later suggest what further we may desire in witnesses, or further facts.

[fol. 7432] June 16, 1932.

Mr. Blackman: We have in court this morning, if your Honor please, the Minute Books of the Executive Committee of the American Telephone & Telegraph Company. Your Honor will recollect that during the testimony of Mr. Heiss, the defendants demanded that those books be produced.

We are producing them subject to that demand, for such use and inspection as you may think proper. Now, of course, we do not think that there is any proper use. Mr. Heiss did not testify to the contents of the resolutions; he testified that he had been directed to set up these amounts for contingent reserve on the books of the Company, and had done it subject to the direction of the officers of the Company, that he had consulted with the officers; but that question was raised, and the books are here."

Cross-examination of R. C. Rainwater continued:

I explained in my direct testimony that all that I put in in Exhibit X-108 were the per cents, that were shown in the second column, and shown in the fourth column, and that I put in certain total figures immediately preceding the grand total. I knew what the statement purported to show. I knew what the figures purported to mean.

"Capital Stock Premium" on the second line of Exhibit X-108 purports to mean an amount of money paid by the stockholders in excess of par, on their capital. I explained at the close of the last hearing how we had worked out

these figures on page 4 of X-108, to develop the percentage of 59.53 per cent, the last figures on X-111.

On page 4 of Exhibit X-108 there is a showing of capital stock premiums of $52,296,147.

If the capital stock premiums, instead of being $52,000,000, had been $252,000,000, I cannot attempt to speculate now on what effect it would have had upon the figure of 59.53 per cent on X-111.

I would not attempt to work it out without having all the details before me. This is a complex mathematical formula, on which this was worked out, and I would not attempt to rework that formula, using other figures, without [fol. 7433] having the opportunity to prepare all of the figures, and work out the proper figure.

As to what effect that change would have on the percentage 59.53 in Exhibit X-111, whether it would be higher or lower, the way the figure is worked out on X-111, it would not make any difference what figure you had in your capital stock premiums, because it is worked out on the basis of the capital stock. It would not make any difference. I said yesterday that I got the figure of 59.53 by using this figure of 63.39. The 63.39 is the percentage relationship of the amount of $719,964,600, to the amount of $1,135,740,062.88. If every one of the figures opposite the lines excepting the totals, and the grand totals remained as they are, and the words "Capital Stock Premiums" had opposite, $252,000,000 instead of $52,000,000 the figure 63.39 would be less. I do not know how substantially less it would be. It would be less. I do not know whether as the capital stock premiums increased, the figure of 63.39 would continue to decrease. If all of the other figures on this particular page of X-108 were to remain constant except the totals, but you were to increase the amount of the premiums, the figure 63.39 would change. As the figure 63.39 decreases, the last figure on X-111, 59.53, would continue to increase. It would continue to increase as long as the capital stock premiums continued to increase, assuming all of the other figures except the totals were to remain stationary.

The percentage 59.53 is the figure of 39.02 shown in X-111, expressed in per cent of return on investment to the American Telephone & Telegraph Company stockholders on their average stock after all of the interest and other carrying charges have been taken out.

That is, it purports to show the return to the stockholder of the American Telephone & Telegraph Company upon his investment in the stock of that company.

If the American Company were earning an 8 per cent return, and all of its stockholders had paid to the company par for their stock, I do not know what return on investment I would get expressed in per cent of return to the stockholders of the American Telephone & Telegraph Company on their average capital stock investment. If you want me to make a computation of that kind, I will be very [fol. 7434] glad to make all of the assumptions that you have made, and report to you what the answer is.

Assuming that we have a little company with a capital of $1,000, 10 shares of $100 par, no bonds, no indebtedness of any kind, just $1,000, and the stockholders have paid in $1,000 for that capital, and assuming that the company is earning $80 a year, then the return on the investment of the company is 8 per cent.

Using the same assumption, the stockholders would be getting an 8 per cent return.

Assuming that instead of paying par for stock in this little company, the stockholders paid $200 for their stock, and the company's capital structure was, capital stock $1,000, and capital stock premiums $1,000, then if the earnings were $80 per year, the company would be earning 4 per cent on $2,000 capital investment.

The company would be earning 8 per cent on its capital stock of $1,000.

"Q. Will you please tell me then how you would figure, what difference that would make in what the company was earning, and what the stockholders in the company were earning, in the way in which you have figured it.

A. Still using the $80 figure?

Q. Still using the $80 figure, yes, sir.

A. Well, if the capital stock was $2,000, and the company was earning $80, why, they would be earning 4 per cent.

Q. They would be earning 4 per cent?

A. Yes.

Q. How much on their capital?

A. How much would the stockholders be earning on the——

Q. Now, how much would the Company be earning on its capital?

Judge Wilkerson: A capital of $1,000.

Mr. Blackman: Yes, sir, the same $1,000.

Q. It would be earning 8 per cent still on its capital, would it not?

A. Yes, sir.

Q. Now, in the way in which you have figured it here, how much would the stockholders be earning on what you have said, per cent of return on investment expressed in per cent of return to stockholders on their average capital stock investment?

[fol. 7435] A. The way I have expressed it—that is, through the method I have followed here, the stockholders would also be earning 8 per cent.

Q. Would they? Would they not be earning 16 per cent, the way you have figured it? On page 4 of Exhibit X-108 you say that the capital stock of the American Company is 63.39 per cent of its total funds. Now, would not that figure be 50 per cent for the little company that we have been discussing, if it had only two items, one its capital stock, and the other its stock premiums?

A. Now, as I understood your last explanation, the total funds of the company were $2,000?

Q. $2,000.

A. Yes,——

Q. And the capital stock represents what part of those total funds?

A. 50 per cent.

Q. What?

A. 50 per cent.

Q. So then that 50 per cent would appear, if we were using the set-up on your Exhibit X-108, page 4,—that 50 per cent would appear in place of the 63.39 which you have used there, would it not?

A. 50 per cent would appear——

Q. Yes.

A. —yes, sir.

Q. Now, then, following the same method that you have followed in these exhibits, you would work out on Exhibit X-111 for this little company that the return to the stockholders is 16 per cent.

A. That is right.

Q. Yes, that is correct. Now, as a matter of fact, you and I know that instead of earning 16 per cent, they are only earning 4 per cent, are they not?

A. I do not know that to be a fact."

If they pay $200 for a share of stock, and got an 8 per cent dividend, they would be getting 4 per cent, but I do not understand that you meant that on the capital stock investment. I was going back to the capital stock only, that is what I had in mind; that is what I was going to take.

If the people have paid $2,000 for their stock and received $1,000 par value of stock, and get $80 per year from the [fol. 7436] company, the actual return on the amount of dollars that they have put out is 4 per cent.

It is not correct to say that by the method which I have followed here, in figuring out the per cent return to the stockholders of the American Telephone & Telegraph Company, I would figure that 16 per cent.

It would depend on which figure you are referring to.

I previously said that following the method which I have used here, assuming the facts with regard to this little company, the return to the stockholders, using the language which I use here, per cent of return on investment expressed in per cent of return to stockholders on their average capital stock investment, I would get 16 per cent.

I stated before, I did not work out the per cent of return on the investment of the A. T. & T. stockholders.

The figure $346,548 in Exhibit X-111 came from X-110.

As I stated before, the method which I have followed applied to the little company with $2,000—$1,000 in capital stock, and $1,000 in capital stock premiums, would result in my figuring out, if I followed the method I have followed here, that the stockholders of that company were getting what I call per cent return on investment expressed in per cent of return to stockholders on their average capital stock investment of 16 per cent, although I concede that they are actually earning 4 per cent on their investments.

Assuming the Company has been in business a few years and has accumulated a surplus of $1,000 so that there is $1,000 represented by 10 shares of stock at $100 each; there is $1,000 represented by stock premiums, the purchasers having paid $200 per share for their stock instead of $100; and there is $1,000 of surplus, and it is still making only $80 as a total per year, that means that the stockholder is getting $4 for every $100 that he paid in.

To figure out the return to the stockholders on the same basis as shown in Exhibit X-111, I want to set up all of these factors in the same way as shown in Exhibit X-108.

"Judge Wilkerson: What is it you are trying to do in this exhibit; what are you trying to express; are you trying to express those figures in terms of something else? Now, what are you trying to do?

[fol. 7437] A. All I was trying to do in the exhibits was, when I showed the per cent of return on investment, to state, after the interest charges and other items payable to outsiders had been taken out of that figure, how much would be available on the stock of the American Telephone & Telegraph Company; that is all I was trying to work out, based on the exhibit that they furnished me, which is A-164 in this case.

Judge Wilkerson: Now, just multiply where you multiplied, and divide where you divided in this exhibit. What per cent do you get—and whether there is any analogy or not, the court will have to decide."

Assuming as in the previous illustration that the little company had $1,000 capital stock, $1,000 premium on stock paid in by the stockholders, and $1,000 surplus, and earned $80 per year, the stockholders would receive 8 per cent on their stock figuring on the basis that I have used in Exhibit X-111. The return to the company would be 2.66 per cent on all of its capital, and 8 per cent on its stock. That is 8 per cent on the capital stock and 2.66 per cent on the total investment.

"Q. I did not ask you that. I said this company had a capital of $1,000, represented by 10 shares of stock of $100 each, and that it had stock premiums of $1,000, and a surplus of $1,000, and that it was earning $80——

A. Earning $80?

Q. —$80. Now, how much return is the company earning?

A. 2.66 per cent.

Q. On all of its capital?

A. That is right.

Q. How much on its stock?

A. 8 per cent.

Q. So that is 8 per cent on the company's investment.

A. It is 8 per cent on the capital stock, and 2.66 per cent on the total investment of the company.

Q. All right. Now, we start with your 8 per cent on the capital stock. Now, assuming 8 per cent on the capital

stock, how much would the per cent of return on investment expressed in per cent of return to stockholders on their average capital stock investment, be?

A. 8 per cent.

Q. 8 per cent?

A. Yes.

[fol. 7438] Q. You are sure of that? Would it not be three times 8 per cent?

A. No, it would not.

Q. Now,——

A. It would be 8 per cent on the—as I use it here, it would be 8 per cent.

Q. Now, refer, please, to your Exhibit X-108, page 4.

A. Yes.

Q. The first figure you develop there is the one that we have been discussing, 63.39, is that right?

A. That is right.

Q. Now, what figure would take the place of that 63.39 on the assumptions that we are making here?

A. 33.33 per cent.

Q. 33⅓ per cent?

A. Yes.

Q. So that, then, according to the procedure you have used, you would use 33⅓ per cent to get from the per cent of return on investment of the company to the per cent of return on investment expressed in per cent of return to the stockholders on their average capital stock investment, would you not?

A. Will you read that question, please. I do not think I understand it.

(Question read by the reporter.)

A. In this particular instance you have cited to me, I would not need to work out any 33⅓ per cent; it would not have any bearing on the calculation that I had to make.

Q. It would not have any bearing?

A. Absolutely not.

Q. Well, now, in telling me how you got there this 59.53 per cent on X-111, did you not use the figure 63.39?

A. Yes, I did——

Q. Did you not have——

A. (Continuing.) —for very obvious reasons.

Q. Did you not have to use that figure?

A. Yes, I did.

Q. Yes. And that figure represented the per cent you have said which the capital stock bore to all the other items shown on that page?

A. That is right.

Q. Now, then, if in the little company I am talking about, [fol. 7439] the capital stock was $1,000, capital stock premiums were $1,000, and the surplus was $1,000, the figure of 33⅓ per cent would take the place of the 63.39 per cent, is that right?

A. It would be—if you set up a statement similar to X-108——

Q. Yes.

A. —yes, sir.

Q. Now, then, if you had 33.33 per cent in this first line, then in proceeding as you have done, you would use 33.33 per cent instead of 63.39 per cent, would you not?

A. No, I would not need to use it at all.

Q. Well, Why not?

A. Well, because the return on investment, as you have stated it, is 2.66 per cent, the average rate paid for funds is 2.66 per cent, and there is nothing to convert over at all.

It is up in the figure on the page of Exhibit X-108, of 8.79 per cent, that you get, on a comparable basis, 8 per cent, and that would still be the return to the stockholders in the American Telephone & Telegraph Company, using the method that I have used. There is no conversion to be made at all; it is the same per cent return on investment and the same per cent of cost of funds shown in X-108. They are the same thing.

Q. Did you not tell me just a moment ago, Mr. Rainwater, before we introduced the figure of $1,000 for surplus, that if the stockholders of this little company paid $200 per share into the company for the stock which they purchased, the method that you have followed here would result in figuring the return, per cent of return on investment, expressed in per cent of return to stockholders on their average capital stock investment, of 16 per cent? Did you not just say that within the last few minutes?

A. I did say that, but I am not sure that I understood all of the factors that you had in the calculation.

Q. You want to withdraw that now, do you?

A. I would like to have you state it again, and I will work it out again, and see if the figure is correct.

Q. All right. We have a company with a capital of $1,000 represented by 10 shares of stock of $100 each. Now, the stockholders have paid $200 for that stock. The company is earning 8 per cent on $1,000, or $80. Now, will you please tell me first of all what return in your opinion the com- [fol. 7440] pany is making on its stock? Can you not answer that question? It has stock, a thousand dollars, and it is making $80. What per cent return is that on the stock? Mr. Rainwater, can you not answer that question?

A. I am trying to figure it out for you.

Q. Trying to figure it out?

A. Yes.

Q. If a company has $1,000 of stock, and is making $80, what per cent return is it?

A. I think my answer should have been, instead of 16 per cent—it should have been 8 per cent.

Q. I am not asking you that question now; I am asking you what per cent return the company that is earning $80 makes on its stock, if it has a thousand dollars of stock?

A. 8 per cent.

Q. 8 per cent?

A. That is right.

Q. Now, you are sure of that?

A. Yes, that is right.

Q. Well, now, suppose it is making that same $80, and it has not only $1,000 of stock, but $1,000 of stock premiums, as well. Now, tell me what per cent on investment expressed in per cent of return to the stockholders on their average capital stock investment, you would work out?

A. If I considered the premiums, too, together with the stock?

Q. Work it out the way you have worked it here.

A. I have already answered your question.

Q. Well, answer it again.

A. I said 8 per cent.

Q. 8 per cent?

A. Yes.

Q. Now, how do you get that; just tell me.

A. If you compare your Exhibit 108——

Q. Yes.

A. —the same setup, the total funds——

Q. Well, just——

A. —would be——

Q. Just please——

A. I am trying to explain how I got it.

Q. All right, go ahead.

A. That is what you asked me for. The total funds would [fol. 7441] be $2,000. They would have paid $80 out to the stockholders. That would be at an average cost of funds, for all funds, of 4 per cent, which is the same as their return on the investment. Now, there is no conversion to make here; it is 8 per cent for the stock. If you consider the premiums, it is 4 per cent for the premiums. That is all—on capital and premiums, it is 4 per cent; that is all that I see that there is to it.

Q. Well, now, will you just make a little sum for me, the same way you have made it here, please, and put in your first line, captial stock—that is $1,000; put in your second, stock premiums, $1,000, or a total of $2,000. Now, then, what figure do you get in your per cent column that corresponds to the first figure on page 4 of Exhibit X-108?

A. Your figure is 63.39, you are referring to now?

Q. Yes, your figure there is 63.39.

A. You would get 50 per cent.

Q. 50 per cent?

A. Yes.

Q. Now, then, will you please take your figure of 39.02 per cent on X-111, and proceed with that figure exactly as you proceeded with the figure as stated in your testimony yesterday?

A. If 63.39 were 50 per cent——

Q. Yes.

A. —and all the other factors were the same——

Q. No, no.

A. —except the total?

Q. No. I am saying, you have this little company; we have your figures, and we have developed a substitute figure of 50 instead of 63.

A. You were talking just now about 39 per cent, and then you say "a little company".

Q. I say, we have——

A. (Continuing) And I do not know which one you are talking about.

Q. We have developed a figure of 50, instead of 63. Now, I want you to start in here on Exhibit 111——

A. All right.

Q. —and use 50 instead of 63, in the same manner in which you proceeded yesterday.

A. And convert the 39.02 over to the other?

[fol. 7442] Q. And convert the 39.02 to per cent of return on investment.

A. All right. The figure would be 73.09.

Q. 73.09; it would be just twice, wouldn't it?

A. No, it would not be. It would be 73.09.

Q. Just give me the calculation on this.

A. The figure 39.02 is the one I am going to start with.

Q. Yes.

A. I am going to substitute 50 per cent in place of 63 per cent.

Q. Yes.

A. I am going to divide 100 per cent by 50 per cent; that is two; that is two times. I am going to subtract 6.87 from 39.02.

Q. What is the 6.87?

A. That is the cost of funds shown on this sheet.

Q. To this company? It has no cost of funds, or its cost of funds is 8 per cent, if you figure it that way.

A. What company are you talking about? Aren't you talking about the American Telephone & Telegraph, now?

Q. No.

A. With all the set of facts you have given me, and then try to apply it to 39 per cent, they have no connections at all. I could not work it out.

Q. You can apply any per cent, can't you?

A. I have tried to give you, using my method, and starting with 39 per cent, to give you what you asked me for, using my X-108, and the answer is 73.09.

Q. 73.09. All right.

A. Yes.

Q. So that the amount that the company gets—the amount that the stockholders get as a return in the way you figure it is almost exactly twice the amount that the company gets?

A. It is whatever the figure is that I have stated to you, related to it. That is what it is.

Q. And, therefore, if you work that same thing back to the little company that we are talking about, and you did not have this cost of money that you have used here, the return to the stockholders on the basis that you have proceeded would be just 16 per cent, and not 8 per cent?

A. No, that is not true. It would have been 8 per cent, because you could not have even in the case of the small [fol. 7443] company a situation that it would not cost them something for their money, and the cost to that company, the cost to them for their money from all sources was 4 per cent, which happens to be identical with their return on the investment, and in arriving at that, the various items, similar to X-108, you have your 8 per cent on the stock, and that is what it still remains.

Q. Well, now, returning to your X-108, suppose the American Company had a surplus of a billion dollars instead of $110,000,000 that appears there on that sheet; can you tell me about how much that would affect the figure 59.53, as you have worked it out?

A. I will be glad to work it out for you and give you the answer. Do you mean, do it now?

Q. Can you tell by looking at it?

A. No, I cannot tell by looking at it, and I would not undertake to.

Q. Will you work it out for me, please, then, and assume these two facts: that instead of fifty-two millions of capital stock premiums, the American Company had five hundred and fifty-two millions of capital stock premiums, and that instead of $110,000,000 of unappropriated and appropriated surplus, it had just a billion dollars more than that; then tell me just how that would affect the figure that you have developed on X-111, the last figure, 59.53.

A. I cannot tell you what the answer would be without working it all out. It involves very large figures here. I would have to arrive at new per cents. I would have to carry the thing all the way through. It would take me——

Q. Take you at least ten minutes, wouldn't it?

A. Probably would, yes.

Q. Then, I will ask that it be done; not now, but at some later time.

Judge Wilkerson: Well, if he doesn't do it, your accountants can do it.

Judge Wilkerson: I understand that this exhibit purports to show what return—the annual return.

A. On the basis of this computation.

Judge Wilkerson: No, I say, you are speaking now of annual return on investment?

A. That is right.

Judge Wilkerson: The purpose of this exhibit is to show [fol. 7444] what annual return the American Telephone & Telegraph Company is receiving on its investment in telephone instruments. Now, you have got a figure of $1,077,794 as their investment in telephone instruments less the depreciation. You take that as the figure which they furnished?

A. That is right.

Judge Wilkerson: The American Telephone & Telegraph Company has that amount of investment in telephone instruments. You take its figure of 6.87, which is the average return shown by this Exhibit A-164, and you get $74,144. Now, you add to that the additional profit to the American Telephone & Telegraph Company, the corporate surplus, and you get that by taking $110,000,000 surplus shown on Exhibit 164, and taking such part of that surplus as is represented by the ratio which the $1,077,000 represents to the entire. Where do you get that figure $346,548?

A. In my Exhibit X-110.

Q. Well, no, what is it?

A. It is the difference between the cost of instruments as I have worked it out, taking into consideration all the expense, taking into consideration an element of return on the money invested, and comparing it with the company's tabulation of what they said was a reasonable allowance.

Judge Wilkerson: Do you mean to say you get an addition to surplus for a single year of that amount?

A. That is right.

Judge Wilkerson: Can you make that computation. You understand what he wants. Have you got it now?

A. I have a computation here on my sheet which I think is what he wants.

Judge Wilkerson: All right.

A. I have shown what per cent it would mean to the American Telephone & Telegraph Company stockholders, if you would consider the capital stock installments, and premiums and the surplus, what this 39 per cent would be, and I have the figure here, which is 47.67 per cent.

Mr. Blackman: I am not asking for that at all. I am asking you to assume the capital stock premiums were $500,000,000 more than they were, and the surplus a billion dollars more than it was, and make the computation and carry it through for me.

[fol. 7445] A. Well, I told you before that those were large figures and would require a number of computations. You told me I could do it later.

Judge Wilkerson: Well, we will take a short recess. See if you can do that.

Mr. Blackman: Have you worked out the figures, Mr. Rainwater?

A. I have worked out the figure that I understood you wanted.

Q. That is the last figure on Exhibit 111. Now, the 59.53 becomes what?

A. Based on the assumptions that you have made, it would become 140.77 per cent.

Q. And that is, as the amount that the people pay for their stock, pay to the company for their stock increases, the return to them in per cent increases in the manner in which you have proceeded?

A. Well, I believe in your computation, you also added a large amount in for surplus.

Q. Yes.

A. A billion dollars for surplus, which is not according to the facts shown here.

Q. Of course not; just using it as an illustration. And the surplus works in the same direction, doesn't it?

A. Yes, if all the other factors are equal, because it reduces the cost of funds."

I will explain how it represents the cost of funds with the illustration that you gave me.

I was asked to add $500,000,000 into the capital stock premiums, for instance. I was asked to add a billion into the surplus.

That increases the total money of the A. T. & T. obtained from all sources 1½ billion dollars. Now, if they did not pay any additional amounts out for dividends or interest, and those figures remain stationary, the cost for funds for that year would be reduced to 2.96 per cent, and using my illustration of 63.39, that figure would become 27.32, and dividing 100 per cent by 27.32 per cent, I would get 3.66. Then, if I subtract this cost of funds from the 39.02 shown on X-111, I get 36.06, which, multiplied by 3.66, becomes 131.98. Then when I add back the dividend of 8.79, which remains stationary, I get 140.77. I think that is what you asked me for.

[fol. 7446] The difference is due to a difference in the cost of money, and the proportions of the stock to the total of all money, those two factors.

The difference in the proportion of the stock to the total funds makes the greater part of this big difference that I have shown here.

In the method that I have worked out here, the more the A. T. & T. stockholders paid into the company for their stock, the bigger the figure I would develop as the per cent of return on investment expressed in per cent of return to the A. T. & T. Company stockholders on their average capital stock investment, but I do not know that you have yourself looked at the sheets that I furnished you. In connection with a number of the sheets that I have furnished you, I worked it out also on the premiums and surplus. I considered those factors of premiums and surplus in some of the sheets that I sent you, but I did not work that calculation out on every possible basis.

I do not know whether any of the other bases have been put in evidence or not. I gave you a figure, though, awhile ago, compared with my 59.53.

I do not think that in these telephone instrument statements that I worked it on the other basis, but I have in some of the exhibits that I prepared.

I have not disregarded the stock premiums and the surplus. I showed right on the face of it what I took. I took the stock only. I did not take anything else.

I have stated that in the computation which I have made with regard to these exhibits which is a complicated one, I find that as the surplus increases, this figure of 59.63 increases, if all the other factors remain stationary.

If one paid $200 or $300 for his stock, there would be a stock premium.

If he paid $100 for the stock, there would be no stock premium.

Assuming that we have $100 paid for stock at par, then there is no stock premium at all.

If you paid $110 for stock, then there would be $10 per share of premium.

If you paid $180 for stock, then there would be $80 premium per share.

As the amount of stock premiums that I deal with in my [fol. 7447] exhibit here, increases in proportion to the stock, my figure of 59.33 would increase.

I don't see how the result would differ whether it was the American Company or what company it was. There would not be any difference in the method because of the difference in the company.

"Q. No difference in the method. Now, won't you get back to that question, after you have worked this out and have seen that the increase in the surplus and the increase in the stock premiums does increase the per cent of return on investment to stockholders, as you have used it here in line 6 of Exhibit 111, and tell me whether it is not a fact that in the way you have proceeded, you would get in the little illustration that I have used an 8 per cent return to the stockholders—an 8 per cent return to the company and a 16 per cent return to the stockholder, neglecting surplus now, taking it step by step?

A. Neglecting the surplus, what do you mean by that?

Q. $2,000, $1,000 for stock and $1,000 for premium.

A. There is no surplus enters into the calculation at all?

Q. No surplus at all, just the simplest possible case.

A. And the return on the investment is $80?

Q. $80, $80 on a thousand, 8 per cent on the stock.

A. And the $80 is the return on the total investment?

Q. Yes, $2,000 the company has had all told, $1,000 of which represents the stock, $1,000 of it stock premiums, and it pays a dividend to its stockholders of 8 per cent.

A. The return is 8 per cent on the stock?

Q. The return is 8 per cent, and it makes no difference in that particular case whether the stock premiums were $1,000 or $10,000?

A. Well——

Q. Is that right?

A. —I do not understand just what you mean——

Q. No, I don't think you do.

A. With your $80, if you are referring to the $80 as being the return on the $2,000.

Q. I am talking of 8 per cent as being the return to the company on its capital stock; just fix that in your mind, 8 per cent is the return to the company on its capital stock. Now, the company's funds consist one-half of capital stock [fol. 7448] and one-half of stock premium. Now, I will ask you whether with those conditions, you do not inevitably work out that the return to the stockholders on the basis you used here is 16 per cent? I thought you saw it when we started the discussion.

A. The company had $1,000—just let me—I would like to have you let me explain how I get at my result.

Q. No, I do not want to know that. Just answer the question, please. We have wasted so much time on this. Tell me now whether the method I have used in developing your exhibits, applied to the simple figures I gave you, don't result in a 16 per cent return to the stockholders.

A. No, it seems to me that it results in 8 per cent.

Q. Well, then, do you think in the case of the simple illustration where we can follow the figures easily, the increasing of the stock premiums makes any difference?

A. You have not increased the stock premiums yet. If you will give me another illustration, starting to increase the stock premium——

Q. All right, I will give you another one. Now, suppose instead of the illustration I gave you, the stockholders paid $1,000 a share for stock worth $100 par, therefore the par of the company is $1,000, but the actual money paid in was $10,000, and there was $9,000 of stock premiums. The stockholders would be making about 72 per cent, wouldn't they?

A. I think I am still not quite clear on one factor that you are assuming.

Q. Yes.

A. Do you assume an 8 per cent on the $10,000 in this illustration, on the $10,000 do you assume an 8 per cent, in other words, $800?

Q. 8 per cent on its stock, Mr. Rainwater.

A. What do you assume on its entire investment?

Q. Eight per cent on its stock. That is the only figure I am giving you.

A. Well, you have to assume some return for me to compare that with.

Q. The earnings and the stock are the two figures which you use to make the comparison, and the comparison works out an 8 per cent, $80 on a thousand.

A. If I understand your computation, that would work out 80 per cent to the stockholders.

[fol. 7449] Q. Eighty per cent to the stockholders. That is, you use my computation?

A. I mean the assumption which was made.

Q. And that is applying to the figures that I gave you the method that you have used in working out Exhibit X-111?

A. Yes."

Based on the assumptions of $8 a thousand or $80, these

stockholders would have been earning less than 1 per cent on the amount of money that they actually put up.

The more the stockholders of the A. T. & T. Company paid for their stock, the higher would be the return to them on their investment (assuming the same dollar dividend) based on just the stock figures only which I have used here without taking the premiums and the surplus.

"Q. That is the way you have proceeded, without taking the premiums and the surplus, except to reduce the percentage of the stock to the total, is that it?

A. I have not reduced the per cent of the stock to the total at all. I have just used figures that you furnished me. I have not made any changes in them."

You furnished me the figures on which I computed the figure of 63 per cent which appears on page 4 of Exhibit 108.

You did not furnish me with that figure of 63 per cent.

I do not think they are unrelated figures.

I use constant figures here. I did not increase the premiums or the surplus. I used the figures that were shown in Exhibit X-108.

"Q. Well, now, you know, Mr. Rainwater, that these figures—this figure of stock premiums is the result of moneys that have been paid for stock in excess of par, you know that, don't you?"

I don't know anything about any of these figures except what the exhibit purports on its face to show.

Referring to the figures on page 4 of my Exhibit X-108, termed capital stock premiums, in the general accepted meaning of what premiums are, it means the amount over and above the par value of the stock.

I know there were premiums paid for the stock of the A. T. & T. Co. I have not the figures that you are quoting, to-wit, that some of the stock sold for $110 and some as high as $180.

The higher the premiums and the more the stockholder in- [fol. 7450] vested, the higher the rate of return would be worked out by the method I have followed, from the same earnings of the American Company, if all the other factors remained equal.

As a bookkeeper, I would say ordinarily that the more a man paid for his stock, the less the per cent return to him from the same amount of earnings, on a total investment would be.

The figures given me yesterday by Mr. Blackman, as the correct average loans of the A. T. & T. to the Illinois Bell, are correct.

Redirect examination.

By Mr. Goldstein:

Since yesterday's hearing I have checked the figures of interest and loans shown in Schedule 213 in the Annual Reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission which were shown to me, together with the following exhibits which Mr. Heiss furnished us, bearing on this subject matter, to-wit: Exhibit X-103, which Mr. Heiss sent us and which I have here in the court room before me, entitled, "Analysis of Estimated Cost of Item 1-D, Carrying Investment in Physical Property used in Rendering License Contract Service; Item 1-E, Holding Funds Available during Period to meet Cash Requirements of Licensee Companies; Item 1-F, Temporary Financing of Licensee Companies."

Also the figures with which the Illinois Bell furnished us, entitled, "Advances from American Telephone & Telegraph Company during the years 1923 to 1925," and which is City's Exhibit 76 in Record Volume VI, page 2097; the exhibit which the Illinois Bell offered in 1929, Plaintiff's Exhibit 78, a continuation of City Exhibit 76 running up to 1929, and which is in Record Volume IV, page 1573. And, also "Supplement to City's Exhibit 76," which continues the advances from the American Telephone & Telegraph Company for the years 1927 to 1931, inclusive, which I have before me.

I have also checked the loans and interest as shown on the books of the Illinois Bell Telephone Company itself and from these I find as follows:

The Annual Reports of the American Telephone & Telegraph Company to the Illinois Commerce Commission, on their face show that the form of the Annual Report was changed in 1926. Prior to 1926 the annual report on its face [fol. 7451] shows only that amount of interest which is accrued and unpaid on particular loans of the licensees which are outstanding on December 31st of the year of the report. That is, the annual reports prior to 1926 only show that amount of interest unpaid on December 31, of the loans that

are unpaid on December 31. They do not show either the amount of loans that were made during the year that have been paid off the day before the year, and they do not show the interest that was paid on all of the loans during the year that were paid off the day before the year, and they don't show any interest or any loans that were carried over from one year to another year, that were paid off before December 31st.

Subsequent to 1926, the annual reports show on their face two columns, first, the interest accrued on the particular loans of the licensee companies which are outstanding at the end of the year, just as appeared in the annual reports prior thereto. That is, if there was a million dollars outstanding on December 31, it would show the interest on that million dollars, but if the million dollars was the balance of a fifty million dollar loan which was outstanding for all but the last day of the year, it would not show the loan of the balance of the fifty million dollars, and it would not show the interest on the fifty million, excepting for this one million dollars.

In the second column, the annual reports after 1926 show on their face the total amount of interest paid during the year by those licensee companies which had loans outstanding on December 31st of that year.

That is, if the Illinois Bell had twenty-five million dollars of loans from the American Telephone & Telegraph Company, and those were paid off on December 28, 1923, the report for the year ending December 31, 1923, would show no loans and no interest.

If the Illinois Bell carried over from 1922 fifty million dollars of loans, and it was paid off on December 28, 1923, and there were no other loans outstanding on December 31st, the annual reports would show no loans, and no interest.

The information, therefore, in the annual reports did not cover the same ground as the ground covered by my exhibits.

My exhibits attempted to take the interest actually paid, as Mr. Heiss showed it in Exhibit X-103, and I distributed [fol. 7452] the actual amount of the loss among the licensee companies as he computed it.

I checked Section 213 of the Annual Reports about which Mr. Blackman spoke yesterday, to see the amount of interest on loans paid by the Illinois Bell and the amount of loans shown in those Annual Reports compared to the

actual loans made by the American Telephone & Telegraph Company to the Illinois Bell and the actual interest paid during those years.

I found that in the year 1927, according to Plaintiff's Exhibit 78 in record Volume 4, page 1573, which facts are also shown in supplement to City's Exhibit No. 76, which has been furnished to us in connection with the present hearing, it appears that there were advances made from the American Telephone & Telegraph Company to the Illinois Bell in the year 1927, as follows: $1,000,000 on March 31, 1927, $200,000 on March 31, 1927, $500,000 on May 2, 1927, $1,000,000 on June 1, 1927, $750,000 on June 13, 1927.

These loans were paid off on or before June 30, 1927. In the annual reports of the A. T. & T. Co. to the Illinois Commerce Commission, Section 213, for the year 1927, the name of the Illinois Bell does not appear; no loans appear for the Illinois Bell; and no interest appears as having been paid by the Illinois Bell during the year 1927.

That is, the plaintiff's own exhibit shows loans were made to the Illinois Bell during the year, and paid off during the year, and interest paid during the year, but the annual reports show neither interest nor loans, because they were not outstanding on December 31st.

Furthermore, as shown in Plaintiff's Exhibit 78, page 1573, of the Record Volume 4, and as shown in supplement to City's Exhibit 76, which plaintiff has just furnished, on December 31, 1926, there were outstanding loans from the American Telephone & Telegraph Company to the Illinois Bell of $13,800,000. Of this, $500,000 was paid off on January 7, 1927, and $13,300,000 was paid off on January 15th, 1927. But nowhere in Section 213 of the annual report does there appear the interest paid by the Illinois Bell to the American Telephone & Telegraph Company for the period of time from January 1, 1927, to the date of payment of this $13,800,000.

That is, the Illinois Bell actually paid interest on $13,- [fol. 7453] 000,000 for fifteen days, but the annual reports could not show them because the $13,000,000 was paid off prior to December 31, 1927.

In the year 1921, according to City Exhibit 76, prepared by the Illinois Bell, there was outstanding on December 31, 1920, advances from the American Telephone and Telegraph Company to the Illinois Bell of $4,000,000. On February 1, 1921, additional advances of $400,000 were made,

and on August 24, 1921, an additional $2,450,000. On August 24, 1921, $6,850,000 was paid off. There was, therefore, on an annual basis average advances of $1,823,333 and neither the loans nor the interest appear in the annual reports for the year 1921.

That is, in the year 1921, there was an average yearly advance from the American Telephone & Telegraph Company to the Illinois Bell of $1,823,333, on which the Illinois Bell paid interest, and the American Telephone and Telegraph Company received the interest, but the annual report was silent both as to the loan and the amount received by the American Telephone and Telegraph Company.

In the year 1922 the American Telephone and Telegraph Company advanced to the Illinois Bell, as shown by City Exhibit 76, prepared and furnished by the Illinois Bell, shows the following loans as having been made to the Illinois Bell:

February 2, 1922, $1,500,000; March 1, 1922, $300,000; March 6, 1922, $1,000,000; May 31, 1922, $1,000,000; June 2, 1922, $300,000; June 30, 1922, $1,000,000; August 3, 1922, $500,000; August 28, 1922, $100,000.

These loans were paid off between June 30, 1922, and September 30, 1922. The average advances for the year were therefore $1,158,077, but nothing appears in the annual report.

When I say the average advances for the year, I mean the advances, which I have just stated, when reduced to an annual basis, would equal a loan of $1,158,077 for twelve months on which the American Telephone and Telegraph Company received the interest, but nothing appears in the annual reports either as to the loan or as to the interest.

For the year 1930, from the supplement to City Exhibit 76, I found the advances from the American Telephone and Telegraph Company to the Illinois Bell outstanding December 31, 1929, of $2,200,000, which amount was paid on January 2, 1930, which, on a yearly basis of average loans [fol. 7454] was $12,228, of which nothing appears in the annual reports of the American Telephone & Telegraph Company.

The books for the year 1920 showed average loans of $2,365,521.

On the basis of taking the interest from the annual reports and dividing by 5.88, one would get $442,755.

For the year 1925, the Illinois Bell Company's books show average loans of $1,983,944, and if you had applied the 5.88 to the interest as shown in the annual report, you would have had $250,000.

On the basis of applying the 5.88 to the interest shown in the annual reports for the year 1920, you would have shown outstanding loans of $12,939,983.

Exhibit X-103 furnished by Mr. Heiss showed for that year $191,500,522.

In 1921, the 5.88 per cent computation divided into the interest shown in the annual report would have shown $16,093,146.

There are some differences that would have resulted from applying 5.88 per cent to the annual reports.

The total differences for the period 1923 to 1930 between the Exhibit X-103 furnished by Mr. Heiss and the computations which would have resulted from applying 5.88 per cent to the annual reports would have been as follows: according to X-103, the loans were $1,626,831,491, and by applying 5.88 per cent to the interest in the annual reports, you would have gotten $1,073,809,794, or $600,000,000 difference.

In X-103, Mr. Heiss showed the actual interest received by the American Telephone and Telegraph Company.

That is $11,511,000 for the year 1920. The interest shown in the annual reports is $760,871.

For the year 1921, the annual reports show $946,000, and Mr. Heiss shows in X-103, $10,595,000.

Similarly, there are differences, for each of the years, between Mr. Heiss' figures in X-103 and the annual report interest.

Those differences in 1922 were: $634,288 in the annual report; $7,813,000 in Mr. Heiss' exhibit; in 1923, in the annual report, $857,671, and $7,605,000 in Mr. Heiss' exhibit; in 1924, $1,020,737 in the annual report, and in Mr. [fol. 7455] Heiss' exhibit, $10,303,397; in 1925, $1,169,546, in the annual report and $13,932,239 in Mr. Heiss' exhibit, and so on.

I also checked the interest which Mr. Heiss showed in X-103, with the average advances for licensee companies shown in X-103, which showed that the American Telephone and Telegraph Company, received interest on those loans, of 5.60 per cent for the year 1929.

On the basis of 5.88 per cent the loans shown in Mr. Heiss' exhibit would have resulted in interest of $14,948,987. Mr. Heiss showed interest in X-103 of $14,554,437, from advances made to the licensees of $254,234,480, and loans of $6,209,209 made to the 205 Broadway Corporation and the Bell Telephone laboratories.

June 17, 1932.

Assuming that a company has total funds of $1,000, of which $500 came from a loan paying 5 per cent interest, $250 from capital stock and $250 from premiums and surplus, and the net earnings are $100, there are several methods that may be used to express the return on investment.

One way of expressing the return on investment would be to say that the company earned 10 per cent on its investment in the business, of $1,000. That would be Method 1. Another way of expressing the return would be to say that as the company had to pay $25 interest on that loan its earnings were sufficient to pay the interest and have available $75 for return on its capital, premiums, and surplus. $75 is equal to 15 per cent on the $500 of capital, surplus and premiums. That would be Method 2, which I understand follows Mr. Blackman's cross-examination of me.

The third method, and the method which was used by the American Telephone & Telegraph Company, would be to say that the company earned sufficient to pay its expenses and its interest, and had $75 return on its capital, surplus and premiums, which return is expressed as 30 per cent on its capital stock of $250. I used these three methods in my Exhibits X-296, X-297 and X-298.

The third method of expression is used by the American Telephone & Telegraph Company in its Annual Reports, and in the Bell Telephone Securities Manual. The earnings are expressed as a certain per cent of return on the outstanding capital stock.

[fol. 7456] Referring to the Bell Telephone Securities Manual, which is Defendants' Deposition Exhibit for identification No. 110, entitled "Bell Telephone Securities, Reference Tables and Descriptions for use of Investors, Investment Houses and Bankers, with a brief introductory statement of the organization and financing of the American Telephone & Telegraph Company and Associated Companies, 1931," which was issued April 15, 1931. On page

10 it shows with reference to the year 1930, net earnings per share of $10.44, and dividends paid per share of $9.

Referring to the Annual Report for the year 1931, which is offered as Exhibit X-307, on page 15 it shows for the year 1930, $10.44 per share. The connection between the last mentioned two documents and Exhibits X-286 and X-287 for the year 1930, is as follows:

Exhibit X-287 shows that on all of its funds in the business, the American Telephone & Telegraph Company earned in the year 1930, 7.21 per cent, that is, earnings available for interest, dividends and amortization charges.

In X-286, this 7.21 per cent is expressed to show how much of the earnings after paying the interest and amortization charges, was available for return on capital stock, capital stock premiums and surplus; but is expressed as a per cent on capital stock outstanding.

X-286 shows that for 1930 the undivided profits and dividends amounted to 10.44 per cent on its capital stock outstanding. This figure is the figure shown in the Annual Report of the American Telephone & Telegraph Company for 1930, and in the Bell Telephone Securities Manual.

The figure for each of the years 1923 to 1930 shown in X-286 ties up with the Annual Reports of the American Telephone & Telegraph Company, and with the Bell Telephone Securities Manual, excepting for a small amount of additional amortization of discount, which the Annual Reports have not considered.

The relation of Exhibits X-286 and X-287 to A-164, of Mr. Heiss, and my Exhibit X-108 is as follows: X-286 shows $10.44 per share is figured on the capital stock of $1,585,669,600, which is the figure which Mr. Heiss showed in A-164 under Average Capital Stock, and which is also shown in X-108 on the first line for the year 1930.

[fol. 7457] I will tie up A-164, X-108 and X-287, for 1930. From X-287 the American Telephone & Telegraph Company is shown to have earned 7.21 per cent on $2,746,624,797 of funds used in the business, which amount of funds Mr. Heiss showed in A-164, and which is shown in X-108. This 7.21 per cent represents earnings available to pay out interest dividends and amortization charges which Mr. Heiss shows in A-164 in the last column, the last line as 6.25 per cent. 10.44, which is the result after deducting the interest and amortization charges, is the return on capital stock, and which was available to pay out the dividend of 8.78 per

cent which Mr. Heiss shows in the first column of A-164, and which is shown in X-108. I will tie up the method used in X-111 to convert the 39.02 per cent to the 59.53 per cent with X-286 and X-287. The formula that I have used in X-111 to convert the 39.02 per cent of return on total funds invested in telephone instruments, to arrive at the 59.53 per cent return available for capital stock premiums and surplus, expressed as a percentage of capital stock only, is the formula which I would use if I were to convert the 7.21 per cent in X-287 to the 10.44 in X-286.

In X-108, I inserted percentage figures which Mr. Heiss did not show in A-164. These percentages are merely to show what portion of the total funds came from capital stock, what portion came from surplus, and what portion came from the funded debt, and what portion came from loans.

They also show what portion of the total dividends, interest and amortization charges would be required to take care of interest and amortization charges and to take care of the dividends on the capital stock. These percentages are inserted as a matter of convenience so as to enable computations to be made from my exhibits to express return from any or all of the operations of the American Telephone & Telegraph Company, by one of the three methods mentioned, namely: 1, a return on total funds; 2, a return available for capital stock, surplus and premiums, expressed as a percentage of such combined surplus capital stock and premiums; or, 3, a return on surplus, capital stock, and premiums expressed as a percentage of the capital stock outstanding. For the year 1923, X-287 shows the [fol. 7458] American Telephone & Telegraph Company earned 8.40 per cent on all its funds available for interest, dividends and amortization.

Exhibit X-111 shows 39.02 per cent to be the return to the American Telephone & Telegraph Company from an allowance of $709,000 for rental of instruments, on the American Telephone & Telegraph Company's investment in telephone instruments.

Exhibit X-286 shows 11.20 per cent as the return to the American Telephone & Telegraph Company from all of its operations in the year 1923, after taking care of all of its expenses and after taking care of the interest and amortization, which was available as the return for capital stock premiums and surplus, expressed as a percentage on cap-

ital stock. As compared to 11.20 per cent on its capital stock available from all of its operations, 59.53 per cent would become available on that portion invested in telephone instruments shown in X-111. My return of 39.02 per cent in X-111 compares with 8.40 per cent in X-287 for the entire company, and my return on telephone instruments of 59.23 per cent in X-111 compares with 11.20 per cent for the entire operations in X-286.

(Defendants offer in evidence Exhibit X-307 entitled "A. T. & T. Co.—Annual Report to Stockholders 1931" and Exhibit X-308, photostatic copies of Section 213 of the Annual Reports of the American Telephone & Telegraph Company to the Interstate Commerce Commission and the Illinois Commerce Commission for each of the years 1920 to 1930, inclusive.)

Recross-examination.

By Mr. Blackman:

I think counsel can answer the question as to the purpose of my testimony relating to the sources from which I could not find the correct figures for the average loans which we had been talking about the day before, better than I can. It is not correct that so far as I am concerned, it had no purpose.

You showed me an Annual Report, and you said I could have gotten the figures for the companies from it. Now, I quoted the figures in the Annual Reports to show that I could not get the figures from the sources that you stated I could get them from. I got the figures shown in City's Exhibit 142. I told you that I had verified your figures, and [fol. 7459] they were correct. The method of making the verification so far as the Illinois Bell is concerned is to go to the books of the Illinois Bell. Of course, we had access to the books of the Illinois Bell, but we did not have access to the books of the other companies. We always had access to the books of the Illinois Bell, and could have gotten those Illinois Bell figures at any time.

The purpose in my testimony concerning the place where I looked for information was merely to show that I was depending upon the figures that you furnished me, which I used, which were based on the quarterly balances. The figures furnished were certain groups of figures showing the average loans of the licensee companies, that were

shown in City's Exhibit 142; I believe is the number, and I think also the later years were furnished as a supplement to City's Exhibit 142.

They were furnished to me through counsel and I used them. I do not know the circumstances under which the original City's exhibit was made up.

That City's exhibit bears across its top in very plain, bold letters, the amounts on January 1st, March 1st, July 1st, September 1st, whatever the quarterly dates are, averaged by dividing by four, but it also shows that these are the average loans during the year, and what was just stated was in parentheses—explaining how the average loans were made up—and how it was worked out.

I had City's Exhibit 76.

I do not know just how to answer your question as to whether there is anything in the testimony that I gave in answer to Mr. Goldstein, which in my opinion shows that the figures opposite the line "Illinois Bell" on X-131, for the years 1923 to 1930, both inclusive, were correct. I told you the figures you gave me were correct, and those are different figures than are shown here. Now those figures shown here are based on the quarterly averages, and the figures you stated, were based on the daily balances. There is that variation.

For the year 1929, on this line I am talking about, on Exhibit 131, I used a figure of $12,412,500. I stated in answer to your question yesterday that the figure you gave me, $7,747,364, was correct.

[fol. 7460] I did not have the correct figures for all of the companies, and I had the loans on one basis for all of the companies, and I used them for the Illinois Bell because that was the same basis there, as for the other companies, and in my opinion it would not have been proper in a set-up of this kind, to show one figure for the Illinois Bell on one basis, and the figure for the other companies on another basis. When I was using these figures for the Illinois Bell, I did not know, as a matter of fact, that they were not correct.

I have seen City's Exhibit 76, but I did not use it in connection with this. I think it would be possible using the dates, to work out the correct figures for this line in question here, from City's Exhibit 76.

"Q. Well it gives you the date of each loan, and when the loan was paid off, and any accountant could very speedily and very easily get the average, could he not?

A. It would be possible to get the average."

When I answered that the figures that you gave me were right, the information was taken from the books of the Illinois Bell. I did not personally go to the books and take it off. I had the information which I had a man take off for me.

I do not believe I had it in my work papers here in court with me, but I obtained it from the papers in our office, after I went back to the office. I do not think I had it here in my possession, by any means.

I have with me here in court the papers from which I obtained it for two of the years, but I have not found the others yet. I have the figures taken off the books here for 1929 an 1930, here before me. I have the analysis of Account 336, analysis of other interest deductions, showing the interest paid, with a notation at the head of the column, "Six per cent minus two—5.88" from which the average loans for the year were computed, for 1929 and 1930. I computed from these figures the average loans for the years 1929 and 1930. I have a paper here which shows the average loans, per the books, for the year 1929, as $7,747,364, and for 1930, $12,228.

That is based on dividing this interest by 5.88. I took some of my work papers and worked this out, and I think these were the sheets that I had for 1929 and 1930. I do [fol. 7461] not know whether I can find the others. The papers now shown to me by counsel (A-219) are not the ones that I got the correct figures from. I have seen them; I think I may have looked at them yesterday. I went through a computation although the figures are stated here correctly, for every year on my papers furnished to plaintiff, because I wanted to check this rate of 5.88 that you told me would work out the correct figures.

These (A-219) are some of the sheets that were prepared under my direction. I did not work them out myself. I prepared the sheets under the direction of counsel and delivered them to counsel for the defendants and they delivered them to the plaintiff. They are not among the papers that I have offered in evidence.

(Plaintiff's Exhibit A-219 offered and received in evidence.)

It is not a fact that when I wanted to find out whether the figures which you gave me were right or wrong, I went

to these papers to find out, and checked them. I went to my work papers, because I wanted to see just what information I had in my work papers.

"Q. And you went to your work papers and figured it all out knowing that you had these where you had already figured it out?

A. You told a figure to me, on the stand, of so many dollars of interest, and I wanted to check that figure."

Exhibit X-115 is a comparison of what was put in the record on page 1038, showing by items the investment, and in Column A the allowance for the telephone instruments; and I have assembled similar items from the exhibits put in by Mr. Heiss in this case, and then I have compared those two presentations with the actual experience, showing the computation of the investment and the cost of furnishing the instruments by items, and then taking out of the total amount for the instruments, the return on investment included in that amount, and working it down to a return on the investment as shown by the books of the American Telephone & Telegraph Company, and allocated to the Chicago Division. That is in general what I tried to do.

In line 7, where I used the legend "Actual return on investment obtained," and the first figure is $454,990, I don't know whether anybody actually received the money or not. [fol. 7462] In connection with that item, I think it is very clear what I meant. I mean this,—that that is the return that would be included in the amount of $709,007; that is what I meant by it; that is the amount that would be obtained if you used the figure of $709,007 as an allowance for the instruments. It would be computed to the Illinois Bell, based on the American Telephone & Telegraph Company's experience. It would be a return of $454,990 to the Illinois Bell if the allowance of $709,007 were given, and the Illinois Bell owned the instruments on the same basis as the American Telephone & Telegraph Company. That is for the year 1923.

Exhibit X-115 refers only to the year 1923, on the heading. I think that is all it is intended to refer to.

I have made other computations for other years not based on the figures in Column A—if you are referring to that. I do not think I used that for other years. In 1923 the Illinois Bell Company owned no instruments and got no return on any instruments.

When I say "Actual return on investment obtained," for the Illinois Bell, $454,990, that is not an actual figure at all. It was not intended to show that it would be an actual figure. By the use of the words "Actual return" I meant, based on these figures that are shown above there on the various assumptions entering into the computation of $709,007, the "actual return" is really what it would be on that basis. At the head of the first column I have "Presentation during the year 1929" and at the head of the second column I have "Presentation during the year 1932." What I meant there was that the presentation during the year 1932 that Mr. Heiss made, as I understood it, was to arrive at a fair allowance for the instruments, and that is in a manner similar to the $709,007. By the use of precisely the same language as the headings of those two columns, I intended to show what this would amount to based on the company's actual experience. There was no intention to imply that they actually received such an amount as that. I know that these computations were made by different people and at different times. I do not know the purposes of the presentation in each case. I understood them both to refer to an allowance for the instruments, and that is the only reason that I have compared them. I looked at the methods and I set up what the methods showed.

[fol. 7463] I think the computation purported to show that one method which I have used here in parallel to the other, was a method that was set up by an officer of the Illinois Bell in 1929 to show what it would cost the Illinois Bell Company to buy these instruments new, and to maintain them in service, and to get a fair return on the capital so invested.

In column 4 "Total Cost of Furnishing Telephone Instruments," I have figured what the return would amount to if the Illinois Bell Telephone Company had gotten an amount of $709,000.

By the use of the figure 64.63, what I tried to do was to work down to a return on investment, assuming that Illinois Bell got $709,000 as an allowance. I understood that there was a claim for an allowance of that amount. The computation of total cost to the Illinois Bell of $709,000, and working out an actual return to the Illinois Bell of $454,990 and a per cent of actual return on net investment to the stockholders of the American Telephone & Telegraph

Company of 64.63 per cent is all based on the American Telephone & Telegraph experience. The amount $454,990 was related to the investment shown in column C of $1,076,383, which is the allocated proportion of the American Telephone & Telegraph Company's investment set up on their books in respect to the Illinois Bell, Chicago Division.

In submitting that percentage of 64.63, all I was trying to show was what an enormous return this amount would be on the basis of the American Telephone & Telegraph Company's actual experience. That is all I was trying to show. The actual experience that I mentioned was that I took their investment as shown on their books and allocated it to Chicago, on the average stations.

If all the company is entitled to in this case is the cost of maintaining these instruments as shown by its experience, then the figure which should be used is $327,965 instead of $709,070, and that's all there is to it. As a matter of fact, in the last column here I purport to show what the actual experience of the American Telephone & Telegraph Company was as I understood Mr. Heiss' exhibits to mean.

"Q. And that is based on instruments that were purchased over a number of years at lower prices than obtained in the years in question, is based upon the deduction [fol. 7464] of a depreciation reserve of 50 per cent which was built up by 10 per cent charges over a number of years prior to 1923, and takes the actual expense that the American Telephone & Telegraph Company incurred in connection with those instruments, that's right, isn't it?

"A. They are all actual items so far as I understood."

I do not understand that this figure of $189,351 in Column B, Exhibit X-115, represents actual depreciation. My recollection of the exhibit was that it meant a deduction of 8 per cent from value new for depreciation. I presume it was for actual depreciation instead of the book reserve for depreciation. There is a difference between columns B and C as to the investment, because they are set up on a different basis. That is due largely to the amount of depreciation which is taken off.

Part of the difference in the two columns is that in one column Mr. Heiss is estimating the figures on the basis of an 8 per cent return, and on the other he is basing it on the actual cost of money to the American Telephone & Telegraph Company. That is not all of the difference between

the two columns. There are differences in the expense items that he included in his allowance.

These two columns B and C down through line 7 in so far as figures are concerned are all shown on Mr. Heiss' exhibit except that in the amount $473,000 I have added back taxes which he omitted. I put the two on the same basis. I think that he understated, a little, the amount that the American Company would have been entitled to on his theory by omitting the taxes.

I have taken the figures, with the exception of the one change we have mentioned, from a comparison which Mr. Heiss himself made.

"Q. And then you have added lines 8 and 9, which he did not use, and then you have added the whole of column A, and you have used your own legend here for lines 1 to 9, inclusive?

"A. Well, line 8, I don't recall that his exhibit exactly showed a line that he called the same as I have called it, but he used that figure of 6.87, that shows in his exhibit."

It appears in line 6. I don't consider "Investment or value new" in line 1 to mean the same thing. I have not shown which was which. The terms "Net investment or [fol. 7465] fair value" I do not consider equivalent the way they are shown here. I have not indicated which of these figures was "fair value" and which was "net investment."

"Q. Anyone looking at the exhibit would understand that the figures were comparative, and were stated on the same basis, would they?

A. I did not intend to convey the idea that each one of these items represented the same thing as the other at all, that they meant the same thing."

In line 8, I figure out what is not the fair return on the value of the property, but the return to the American Company on its investment in the property. In line 9, I step that figure up by finding the per cent actual return on net investment converted to average return to American Telephone & Telegraph Company stockholders in the same manner in which I stepped up the similar figure in Exhibit X-111.

What I did in Exhibit X-117 was to work out the annual allowance of the Public Utility Commission in the

order of December, 1920, to show on the basis of the figures for the year 1920, that is the average stations in service, what the allowance would be at $1.13 per station, and I worked that out, or I compared that figure with what the cost of furnishing the telephone instruments would be, based on the American Telephone & Telegraph Company's actual experience, and including a return on investment at the annual cost of funds. As a final result here, I get a per cent of profit to the American Telephone & Telegraph Company on its average investment of 45.17 per cent, from the order of the Commission. To get "Profit to American Telephone & Telegraph Company, $343,122" in line 4, I took the allowance of the Public Utilities Commission at $1.13 per station and applied that to the average number of stations for the year 1920, then I worked out what the cost of furnishing the telephone instruments would be, which is shown in my Exhibit X-116, based on the experience of the American Telephone & Telegraph Company, including a return on investment. I followed that method throughout all of my calculations, and in all of my exhibits, consistently deducting the entire reserve which the American Company has set up, and I am purporting to figure out a return on the net cost to the American Company, taking what is paid for the property in the first instance, and what it had set up on its books as [fol. 7466] a reserve, deducting the reserve, and getting a balance; that is the figure I use in every case, and that is the figure on which I compute what I call per cent return. I used the same method as Mr. Heiss in Exhibit A-166.

I have presented about eighty or ninety exhibits to this court in the last few days. The calculations are based on what the books show; that is, based on the original cost as I took it from the books, less the depreciation reserve shown on the books. That is the consistent principle I have followed throughout.

On Exhibit X-117, I say "Profit to American Telephone & Telegraph Company." That is the difference between the amount which the Commission said it would be fair for the American Telephone & Telegraph Company to get, and the amount which I figure out it would have cost the American Telephone & Telegraph Company.

In a number of my exhibits, I make a comparison of what I call the return to the American Company from

other associate companies. Whether I use, as the figure of the return, the dividends and interest, depends on what exhibit you are referring to. All of them do not show dividends and interest, but a number of them show dividends and interest. In a great many of them I have lumped together the dividends and interest received by the American Company from the Illinois Bell, and compared those figures with the dividends and interest received by the American Company from other associate companies. My Exhibit X-284 shows both dividends and interest separately. I don't know whether any other exhibit shows both separately. There is at least one that shows both separately. Most of them lump them. In those cases where I have made the comparison of the mixture, as an accountant, I think that that comparison means something.

In my opinion, as an accountant, if I wanted to find out the relative values to the American Telephone & Telegraph Company, and the relative profits to the American Telephone & Telegraph Company from two companies, it would make no difference to me that the moneys received by the American Telephone & Telegraph Company in one case were 99 per cent bond interest, and 1 per cent from stock dividends, and in the other case were 99 per cent [fol. 7467] from dividends, and 1 per cent from bonds. I put the two items together. I think that is clear that I put the stock and the loans together, and I worked out the dividends and the interest on those loans in respect to the Illinois Bell, and I compared the same thing with the other companies.

If the dividend rate were 8 per cent and the interest were 5.88 per cent, under my method, the average return would vary, based on the proportions of the stock and loans. The proportions of stock and loans and the dividend rates are factors that enter into it.

"Q. And in some forty or fifty sheets you have worked out the comparison between what you call the yield to the American Company from the Illinois Bell, and the yield to the American Company from other associate companies on this basis of comparing a mixture of interest and dividends in one company with a mixture of interest and dividends of another company, is that right?

A. The comparisons are the same for the Illinois Bell as compared with the other companies.

Q. And because the Illinois Bell, for special reasons that have been stated here, are paying small amounts in interest, the comparison shows that the return, as you call it, from the Illinois Bell was a little better than it was from some of the other companies, is that right?

A. The return—in the comparison of the Illinois Bell, the returns from the other companies are all based on these factors that I have mentioned a while ago."

What I tried to show in connection with those items is the comparison of the return on the stock and the loans together; in other words, in some companies the American Telephone & Telegraph Company made a large number of loans, made large amounts of loans, in other companies it made small amounts. It got interest on the money which it loaned, and it got from the same company dividends on stock.

As to what relation those two things have to each other in this case, I wanted to show what the total return was on both of these items of investment that the American Telephone & Telegraph Company was getting. Interest on money is what the American Telephone & Telegraph Company received for the money. I did figure dividends on stock. I figured first, the dividends, then, in some other sheets I put the loans together with the stock and showed [fol. 7468] the return on the two items combined. They show on their face that they are made that way.

When I developed these percentage figures that I used by comparing this so-called return with the investment of the American Company, I go away back to the original cost to the American Company of what it paid for the stocks in these various associate companies.

In the case of the Pacific Company, I show the return on the stock for the year 1923 was nothing; the year 1924 was nothing; the year 1925, 6.54; the year 1926, 7.63; the year 1927, 7.39; the year 1928, 7.33; the year 1929, 7.33; the year 1930, 7.19.

This is the return to the American Telephone & Telegraph Company on its investment in the stock of the Pacific Company.

I don't recall any such figure as 100 per cent return from the Pacific Company. If there is any such figure, it strikes me it must be a typographical error. I don't recall any such figure as that. In my comparisons here, I

am dealing with what the books showed to be the American Company's investment in the stock of the associate companies.

In Exhibit X-278, the figures that I develop as the percentage of dividends and undivided profits of licensee companies to investments by American Telephone & Telegraph Companies in common stocks of licensee companies converted into average return to stockholders of American Telephone & Telegraph Company on their investments in capital stock of American Telephone & Telegraph Company for the years 1920 to 1922, inclusive, are as follows for the Pacific Company:

For the year 1920, 118.14 per cent; for the year 1921, 144.59 per cent; for the year 1922, 159.20 per cent; and the year 1923, 118.47 per cent. The next year it goes down to 44 per cent, and after that diminishes. By the method I have followed here, I worked out a return with respect to the Pacific Company as high as 159.20 to the American Telephone & Telegraph Company stockholders, on their proportion of the investment, after considering the dividends and the undivided profits.

In Exhibit X-124, it shows that the Indiana Bell Company paid no dividends at all during 1923, 1924, 1925 and only 4 per cent in 1926; 6½ per cent in 1927; thereafter, 8 per cent.

[fol. 7469] In Exhibit X-130 I show what I call the amount required to equal the average Illinois Bell Telephone Company return on capital stock.

I show those figures for 1923 as $863,796; for 1924, $861,376; 1925, $1,333,986; 1926, $946,185; and 1927, $322,751. This exhibit merely is to show how much it would be in terms of dollars that the Indiana Bell would have to pay to the American Telephone & Telegraph Company on its investment in the stock of the Indiana Bell, if it were on the same basis as the Illinois Bell. I use that information in X-137, and there the above amounts are raised to include loans, and the total equalizing figure for stocks and loans is for 1923, $1,111,829; for 1924, $1,134,571; for 1925, $1,555,573; and for 1926, $1,010,741; and for 1927, $409,027. They purport to show the amount that would be required to equal the average return of the Illinois Bell to the American Telephone & Telegraph Company on the American Telephone & Telegraph Company's investment in stock and loans of the Illinois Bell.

The exhibit shows that the Illinois Bell was doing so much better than the Indiana Bell that the Indiana Bell would have had to pay to the American Company these amounts that were read off last in order to equalize its payments to those of the Illinois Company.

In Exhibit X-142, I show the license revenue from the Indiana Bell Company to the American Company. That starts out at $363,065 in 1923, and increases to $464,987 in 1927. I then deduct from these amounts the stock and loan deficiency which was just read and I do that to place the company on an investment basis comparable to the Illinois Bell Company.

What I meant by that was this: in connection with the license contract there were certain losses on the loans, and there were certain losses on holding funds available for stocks and loans. Now, what I did here was to put this item in to show if all the companies were on the same basis as to return as well as to losses, that that is what it would result in. That is a comparative figure only. I put it in there to show what it would be if they were all on the same basis. I thought it would illustrate the inequality of the financing between the companies. They were all gone over by attor-
[fol. 7470] neys.

All of these figures that I have used here, and all of this approach that has been spoken of, leads up to the fact that because the Indiana Company and some of the other companies were not doing very well in these early years, that the amount of license contract payment from the Illinois Bell to the American Company should be reduced or that the license payments of the other companies should be increased.

"Mr. Blackman: Yes, that is working it out on your last, according to the argument which underlies this long list of papers, we should have charged the Indiana Bell Company 18 per cent as its license contract payment in these years in question."

(Objected to by defendants.)

It figures out about 18 or 19 per cent.

Referring to my testimony on re-direct examination in which I said that the company that had a thousand dollars of capital and nine thousand of stock premiums would earn 80 per cent, based on what I said was the American Com-

pany's method, the figure 80 per cent was based on what I understood your assumption to be and that was on a thousand dollar stock, nine thousand in premiums, and a total of ten thousand dollars, and an 8 per cent return. That is what I considered it, an 8 per cent return on the full amount of the investment, that is how I figured out the 80 per cent.

"Q. Do you mean to say that after going over that for a day yesterday, you considered that the return was eight hundred dollars, and not eighty dollars?

A. I understood when you first questioned me about it that you were talking about an 8 per cent return, so I was confused as to what per cent return you were referring to. If you figure 8 per cent return on ten thousand dollars, you get $800, which is 80 per cent on the capital stock of a thousand dollars, and that is what my computation was.

Q. Do I have to go over this again?

A. That is what I meant.

Q. Do you mean now to say that in answering the questions that I put to you yesterday, that you were considering that the return was eight hundred dollars, and not eighty?

A. I was confused——

[fol. 7471] Q. No, answer that, please?

A. That is what I had in mind, 8 per cent return."

If we have a company with ten thousand dollars, which it has invested, one thousand of that is the par value of its stock, and nine thousand of that is stock premiums, and it is earning eighty dollars a year, if I worked it out in the same way that I worked out the figures on X-111, the per cent of rate of return to the stockholder of that company on his stock investment would be 8 per cent.

Tying this illustration up with X-108, what you have given me would amount to an .8 per cent return on an investment, and the cost of funds would also be .8 per cent, and using the exact method that I followed, the figure that would compare with the dividend rate in the last column of X-108 on the thousand would be 8 per cent and that would be what my method would work out, it would work out to 8 per cent on a .8 per cent return, but on an 8 per cent return, it would be 80 per cent.

"Q. Well, now, I am asking you to assume an 8 per cent return to the company on its stock, and tell me how much return to its stockholders, that would mean, figured in the

way you figured X-111, to get the figure of 59 plus per cent?

A. An 8 per cent return on a company with a stock of a thousand dollars, premiums of nine thousand, total funds in the business, ten thousand, 8 per cent return on that, $800, would figure 80 per cent return to the stock."

That would be on the par value of the stock, without considering the premiums. But if you consider the premiums, then, on the illustration you have given me it would be 8 per cent, which is the same figure as the return on investment.

There would not be any change in the percentage if there were no change in the earnings, but if you combine your stock and your premiums together, when you put in more premiums of course you are going to reduce your return, but if you do not change your earnings, and you will take the same stock, you are not going to change your per cent on the stock itself, on the par value of the stock.

As to whether my method inevitably results in figuring out a larger profit to the stockholder from the same identical return, the greater the amount he has paid for his stock, if he pays it to the Company, I don't know what you mean [fol. 7472] by "return." That is where I get confused, because you don't tell me what return you are relating it to. I will admit that I was confused in the way you put some of the questions to me yesterday, but I know that my method is right, and that it gives me the right answer.

I understand that the American Company uses a method by which I could figure out an 80 per cent return in the case that was given. As to what the American Company does to justify my method, I worked out a per cent of return on the par value of the stock, and that is what the American Company does in its annual reports to the stockholders, and in the Bell Securities Manual it shows the return on the stock, and that is what I have tried to work out on their figures, the return on the par value of the stock, without considering premiums and the surplus. I told you this morning that in some of my other exhibits I have showed it on both bases, on the par and also on the par, premiums, and surplus.

The things I refer to as justification for this are:

The Bell Telephone Securities Manual for the year 1931, page 10, shows $10.44 net earnings per share on the stock. That is $10.44 per share on the par value of the common stock, and that is what I have used in all my figures. They

are identical. As to whether there is anything else justifying my procedure, there may be other places where the American Company referred to the par value of the stock; I don't know. But I know that when they speak of the earnings, they refer to the earnings on the par value of the stock, and what I have worked out is in relation to the par value of the stock. That is what I had in mind when I answered Mr. Goldstein that the third method that I mentioned was the American Company method.

Yesterday you asked me to add five million dollars to the capital stock premium figure, which appears on page 4 of X-108. You asked me to add a billion dollars to the surplus that appeared on page 4 of X-108. I don't recall that you were trying to work out a new conversion figure on X-111. I certainly didn't understand that. I remember working out a calculation, but I don't remember all the details of that calculation. The record will show. I remember I worked out a figure—I think it was 140 per cent. I don't recall the exact figure. If it was based on X-111, why, [fol. 7473] that it what the calculation was. I don't recall all the details of it. I do recall that I made a calculation, but I had not recalled what particular exhibit was referred to yesterday. It was the return as expressed on the par value of the stock. I can't recall all the details of the calculation now.

There are a lot of calculations will have to be made to add $500,000,000 to the capital stock premiums shown on page 4 of X-108. I have not the paper that I made the calculations on yesterday. I must have destroyed it. I haven't it now. I just may have misplaced the paper. I haven't it now. The record shows that I said "Based on the assumptions you have made, it becomes 140.77 per cent."

I computed it hurriedly, and I am not absolutely sure that making the assumptions Mr. Blackman asked me to make, by adding the amounts in the exhibit, making the computations according to my method, that it is the correct percentage.

I now seem to get the same figure of 140.7 per cent, but I would like to have the opportunity to study the figure and study the method; if I have worked it out wrong, I am perfectly willing to rectify it. (It was agreed that the figure would stand unless corrected later.)

As to why that figure went up, I would like to study the method and study the figure, and see if it is right, and

if I am not right on it, I would like the opportunity to correct it. It may be that this method would cause the figure to go up if you increased either the capital stock premiums or the surplus. It seems to be true that if you increase either the capital stock premiums or the surplus on my Exhibit X-108, and followed through the method that I have adopted with regard to X-111, that the percentage figure on X-111 would have to go up.

All I would like to do on this would be to study my method and see if I have computed it correctly, and if it is not computed correctly, why, I am perfectly willing to correct whatever error there is in it. That figure would have to go up, following the method that I followed, if you increase either the stock premiums or the surplus.

It seems to me there is one fallacy in the statement of counsel that under my method, as shown on X-111, the [fol. 7474] larger the amount the stockholder pays directly to the corporation for his stock, the larger will be his return, on the same dollar dividend. This fallacy is that, this figure of investment is related to a figure that I have shown on my X-111. Now, what you are doing when you put in these capital stock premiums is changing the relationship of the investment figures. It seems to me that is what you are doing. It produces a different answer, according to the calculations that I have made here.

I am to be understood as saying that if I apply my method on the assumption that counsel has made, it will produce the result of increasing the percentage. As an accountant, I can think of circumstances that would prevent this result from following, that is, if you change the other factors; if you change earnings and those other factors that enter into return on investment. Everything remaining constant except the variables, surplus and premiums, I cannot think of any conditions which will not produce the result of increasing the percentage, if you increased those variables.

Re-redirect examination.

By Mr. Goldstein:

"Mr. Goldstein: I direct your attention to the following statement in the Bell Telephone Securities Manual for 1930, for the use of investors, investment houses and bankers, with a brief introductory statement of the organization and financing of the American Telephone & Telegraph Company and Associated Companies, which reads:

'Financial Policy. The policy of the American Telephone & Telegraph Company set forth in a recent Annual Report follows:

'The American Telephone & Telegraph Company accepts its responsibility for a nation-wide telephone service as a public trust.'

'Earnings must, of course, be sufficient to permit the best possible telephone service at all times and to provide a reasonable payment to stockholders with an adequate margin to insure financial safety. Earnings in excess of these requirements will either be spent for the enlargement and improvement of the service furnished, or the rates charged for the service reduced. This is fundamental in the policy of the management.' "

[fol. 7475] The Witness (continues): I thought that my method would get the exact measurement of the amount of the dividends and the amount of earnings over and above that, so that I could compute the margin to insure the financial safety, but I want to check up on the method and if it is wrong, I will be perfectly willing to rectify it.

The net earnings per share of the American Telephone & Telegraph Company stock, available for dividends, which is shown on sheet 10 is the same identical document which shows the $10.44 which I used in my exhibits.

. . . . . .

[fol. 7476] CHARLES R. WHITWORTH, called as a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct examination.

By Mr. Haight:

June 18, 1932.

My name is Charles R. Whitworth. I reside at Highland Park, Illinois. My occupation is certified public accountant with Touche, Niven & Company. I have been with that company 19 years. Before that I was with Price, Waterhouse & Company for seven years, and prior to that I was six years in London, England, in the same line of work. I am resident partner of the Chicago office. I have personally been in charge of general audits and examination of books, records and accounts of manufacturing, mercantile and

banking concerns. I am engaged in work of that sort at the present time.

In connection with my work, I have on behalf of my firm issued auditors' certificates covering the findings of my company as a result of our examinations of the books of such companies, with respect to their profits and their assets. I was here when Mr. Hagberg testified as to the operations of Touche, Niven & Company; I heard his testimony. He stated correctly the nature of those operations,—the extent of the operations, and the character of the work done by Touche, Niven & Company.

I am a member of the American Institute of Accountants, New York Society of C. P. A.'s, Illinois Society of C. P. A.'s and the Institute of Chartered Accountants of England and Wales.

In order to make an auditor's certificate covering the subject matter of their examination relative to profit and return on investment, it is generally customary for an auditor to be given free access to all books and records, including the corporate minute books and all correspondence with the Internal Revenue Department, so that he may make an unrestricted examination of the affairs in order to determine that the books and accounts are correctly kept, and that all [fol. 7477] of the transactions of the company are recorded therein; and also to enable him to get the characterization of the transactions whose figures are recorded in the books of account.

There is a practice among accountants, in regard to the breadth of opportunity that is given an accountant in making an examination of the character that we have been describing. If we go into a bank or a business place, for example, we are allowed to examine whatever we ask to see. We tell them we want all of the books of account and we expect them to bring them to us. We do not go looking for them around the premises, but we probably would look to see if there was a complete set of books furnished to us. We would ask them whether that was all.

After we go in and ask them if they have a private ledger, that is as far as we go. We would not necessarily start a physical search of the premises to see whether there was a private ledger or not.

In order to certify to the correctness of accounts, it is necessary to examine all of the books and all of the documents that may be necessary, in order that we may satisfy

ourselves that we have all of the information necessary for us to have.

I have met Mr. Gregory, comptroller of the Western Electric company. My first meeting with him was on December 28, 1931, in his office at 195 Broadway, New York. There was present Mr. J. G. Wray I think, and probably Mr. McCann. Mr. J. G. Wray is one of the engineers employed by the City of Chicago in the present case. I had a conversation with Mr. Gregory at that time with regard to the examination to be made of the Western Electric Company's books and accounts.

I told Mr. Gregory that Touche, Niven & Company had been employed on behalf of the City of Chicago to make a general investigation of the records of the Western Electric Company to determine its profits and return on investment for the years 1916 to 1930.

Mr. Gregory stated that he would be very glad to cooperate with us, provided we stated in writing the specific books and records we desired to see, and the nature of the [fol. 7478] information that we wished the Western Electric Company to supply, and that such request would be taken under advisement by the Western Electric Company and its counsel, and that we would be informed of the decision. The personnel of our organization was also advised of this information.

These inquiries into the affairs of the Western Electric Company and the American Telephone & Telegraph Company, in so far as Touche, Niven & Company are concerned, were in charge of Mr. McCann under my supervision, in New York, and Mr. Hagberg, in Chicago.

The work was under my general direction. I prepared a statement regarding the men who were employed and the time put in up to and including May 31st. I have it here.

(Said document was marked Defendant's Exhibit X-309, entitled, "Summary of Time by Hours, Touche, Niven & Co.")

Some of the men were working in both New York and Chicago; there were some Chicago men working in New York, and Mr. McCann from our New York office was working here in Chicago. This listing then simply indicates the exact number of hours of Touche, Niven & Company with whom they are associated.

This conversation with Mr. Gregory was on December 28, 1931.

Cross-examination.

By Mr. Thompson:

I have produced in court an instrument which is identified as Exhibit X-309, which shows the total number of hours spent by Touche, Niven in doing work in this case, of 7,465 hours. Practically all of it was spent examining the books of the Western Electric Company and its subsidiaries, or making the figures taken from those books. I should think that more than half of it was spent in examining the books themselves. More than one year's time of one man was spent in a direct examination of the books of the Western Electric Company and its subsidiaries, that were turned over to us for inspection.

I cannot say exactly when Exhibit X-79 was first pre- [fol. 7479] pared. I cannot answer when I first saw it. I would say some time in the early part of the year probably January, 1932. I do not know that it was submitted to me so that I could pass upon the question of whether Mr. McCann would testify to that sheet. I saw the exhibit, but it was not submitted to me for any particular purpose, except that they were all going to be used for this examination. I approved a great many exhibits; I do not know whether I approved this one or not.

"Q. Well, look at it now and see whether you approve of it?

A. What do you mean by that?

Q. Whether you think that is a fair statement of the facts.

A. In what respect?

Q. Just look at the exhibit; in any respect appearing on the exhibit.

Judge Wilkerson: May I see it?

The Witness: The exhibit speaks for itself.

Mr. Thompson: I see. You do not care to look at it further, or to say whether this exhibit which has been put in by one of your employes fairly represents, in your opinion, the facts in this case?

A. I repeat that the exhibit speaks for itself.

Mr. Thompson: Will you read the question to the witness, please, Mr. Reporter?

Q. (Read by the reporter.)

The Witness: I am ready to answer any questions that they want to ask about it.

Mr. Thompson: Your Honor, I think I am entitled to an answer to that question. It is a very simple and plain question.

Judge Wilkerson: Well, he has answered it, has he not?

Mr. Thompson: Sir?

Judge Wilkerson: He has answered it, has he not? What was the question you asked him?

Mr. Thompson: Read the question again.

Q. (Again read by the reporter.)

A. I have already answered, that the exhibit speaks for itself, but I am further willing to give any further information that I may have in that connection."

(Plaintiff's Exhibits A-222 and A-223 were marked for identification.)

[fol. 7480] (It was agreed that Plaintiff's Exhibit A-222, which purports to show documents submitted to Touche, Niven & Company for examination in New York, from March 29, 1932, to May 9, 1932, and Exhibit A-223, which purports to show documents submitted to Touche, Niven & Company at Chicago from February 29, 1932, to June 13, 1932, both supplemental to the list contained in Plaintiff's Exhibit A-73, are correct.)

My conversation with Mr. Gregory was on December 28, 1931. Mr. Gregory, did not, to my knowledge, say that there were cases pending in a number of other jurisdictions, where the Western Electric Company was being required to furnish a large amount of information for courts and commissions. I knew that was a fact. I knew that there was then pending a case before a master in the Federal Court in Michigan, involving the reasonableness of the Western Electric prices. I knew that there was then pending a case before a master in the Federal Court at San Antonio, involving the same question.

I knew that there was then pending an investigation before the Public Service Commission in Ohio involving the same question. I knew that this case was then pending, also an investigation before the Public Service Commission of Wisconsin.

Mr. Gregory said that the practice was to make the request in writing. I made no protest or objection to that at all. I think I said to him, "That is satisfactory to me." I am not making any protest about it now.

Exhibit X-79 relates itself wholly to its consideration of the Electric Research Products, Inc., and the investment of the Western Electric Company in that corporation.

There is no information which appears on that sheet other than information or data relating to Electrical Research Products Inc., and the Western Electric Company's investment in that corporation. For the preparation of that exhibit, or for a knowledge of the facts in connection with it, all that I needed was the books of Electrical Research Products, and the books of the Western so far as the investment in Electrical Research Products by the Western Electric was concerned.

[fol. 7481] It is not entirely correct to say that when we started out, it was merely to ask the Western Electric Company to allow us to inspect its books and records, but to prepare statements for us.

It is true, that time and time and time again in this correspondence, what we did was to request the Western Electric Company to prepare a statement which we wanted, that required work to be done by the Western Electric Company. We also asked them to see the books in several instances, in connection with our studies.

I recognize a letter that I wrote to the Western Electric Company on January 12, 1932.

(Letter marked Plaintiff's Exhibit A-224 for identification.)

I dictated the letter and signed it personally.

(Carbon copy of letter marked Plaintiff's Exhibit A-225, for identification.)

I received the original, of which Exhibit A-225 is a carbon copy, which letter contains the following:

"It is understood that the books of Electrical Research Products, Inc., are open for your examination," and I do not know and I cannot answer whether, pursuant to that letter, all of the books of Electrical Research Products, Inc., were offered to us for our inspection and examination by the Western Electric Company and the Electrical Research Products Company. I have nothing personal with it,—beyond super-

vising,—I have not seen the books of Electrical Research Products myself at all. I had charge of this investigation.

Mr. McCann will have to state to the court, with respect to Exhibit X-79, what information we applied to the Western Electric Company for, in connection with that exhibit that was denied to us. He applied for the books, and he was instructed to see them. We have a list of the things that were denied. I do not have it with me; it is in the correspondence which Mr. Haight has.

To name the things denied us, I will have to get the correspondence, and show you the list that Mr. McCann has prepared. There are several of them. I cannot name one of them; Mr. McCann will present that.

Exhibit X-79 purports to show per cent return in one year, [fol. 7482] 1929, of 309.4 per cent. It states what the investment was based on. I do not know what it was based on beyond what it says on the exhibit. I would have to refer to the working papers again.

Statements are sometimes prepared showing the per cent of return which the Company was making on the original dollars invested in the business, excluding the earnings and surplus. I could not say whether I ever did it. I would have to get that information. Whether Exhibit X-79 takes into consideration the loans made by Electrical Research Products from the Western Electric Company, and used in the business I can find that out from the working papers. I cannot say without referring to those papers. I have seen the papers, but I would not answer that question directly, offhand.

The capital invested in the foreign business is included in the statement of profits made by Electrical Research Products, Inc., on its foreign business. I would have to get the papers to tell whether in arriving at the figure of 309.4 per cent in Exhibit X-79 the capital invested in the foreign business is included. I do not know without looking at the papers. I knew that this exhibit was to be offered in evidence in court. I did not know the purpose; the only purpose I knew, was to show the return. I did not know what figures would be produced. I have seen the exhibit several times.

"Q. Now, I want to ask you whether in your opinion it requires more information to enable you to certify to the statement—or the balance sheet of an industrial or manu-

facturing corporation, so that that sheet may go out and be used in the sale of the stock and bonds of the company, than it does to support sworn testimony on the witness stand, as to the facts?

Mr. Haight: I think that is an objectionable question.

Mr. Thompson: I think it is perfectly proper.

Judge Wilkerson: What is that question? I did not get it.

Mr. Thompson: Read the question, please.

Q. (Read by the reporter.)

Judge Wilkerson: I think that is a fair question, for the representative of an accounting firm. I will put it this way, if I may——

[fol. 7483] Mr. Thompson: Certainly.

Judge Wilkerson: If I may change your question.

Mr. Thompson: Certainly, your Honor.

Judge Wilkerson: Although perhaps I will not do as good a job as you, but I think this is what you would like to know about in connection with this exhibit. Now, we are getting at the practice, not the general practice among accountants, but the practice of your firm. Here is a statement, which you knew was to be offered in court, and was to come before the court, and three judges were to be asked to make a finding of the return based upon the percentages which you had estimated. You knew that; that is, you knew that that use was to be made of it.

The Witness: Yes.

Judge Wilkerson: You knew we were to be asked to adopt those percentages as indicating the return of the Electrical Research Products Company.

Now, just what is your practice, your general practice, where you are confronted with a situation of that kind, and you are denied access to some essential document, or some essential book? Is it your practice to make up papers from those books to which you have access, and send them in, or is it your practice to advise the court that you have not the necessary papers upon which to make an estimate?

The Witness: It is generally necessary to advise the court that we have not the necessary facts.

Judge Wilkerson: So you had everything which in your opinion you thought was necessary to the ascertainment of these percentages, or you would have told the court that you did not have the documents, or the books from which to make them, would you not?

The Witness: Yes, sir.

Judge Wilkerson: All right; go on."

During the course of the examination which you were making of the Western Electric Company's books and records, we were giving some information to Mr. Goldstein ourselves. I suppose it was also coming directly from the Western Electric Company to Mr. Goldstein, as I was getting it. I knew we were not the only source through which information and examination of the Western Electric Company's books and records was being made by the City of Chicago.

[fol. 7484] First there was our firm, and we were operating both in New York and Chicago. And then there was Mr. Goldstein, who was to our knowledge writing many letters all the time about this question. The firm of James G. Wray also got information from the Western Electric Company during this period; also the Illinois Commerce Commission. There were four sources through which information was being obtained from the Western Electric Company.

Redirect examination.

By Mr. Haight.

When I said that men were employed in working upon these books for more than a year's time, I meant one man, more than one year, but actually we have had many men who have been engaged on and off since last December. On a seven-hour day that would amount to about three years for one man.

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[fol. 7485] George B. McCann, a witness on behalf of the defendants, having been previously duly sworn, resumed the stand, and testified further as follows:

Direct examination.

By Mr. Haight:

June 18, 1932.

I have made several requests in writing of the Western Electric Company for information. I have certain of the copies of these written requests. The first one is a letter of January 12, 1932, addressed to Mr. Gregory. I received an

[fol. 7486] answer to item 4, on the letter of Jan. 12, 1932, but it was not the information that was requested at the time.

Item 4 is entitled "Basis of Profits on Deferred Payments on Installment Sales, i. e., a description of deferred receivables." Under date of January 13, Mr. Gregory replied stating that he would furnish us with the information. Under date of January 19, 1932, we received a further reply from Mr. Gregory, who furnished us at that time, in answer to item 4, a statement showing by years analysis of deferred receivables on monthly report number 1. This was not the information that we requested under date of January 12th. We asked for a description of deferred receivables. We desired to know the basis upon which the Electrical Research Products, Inc. took up its profit on deferred payments on installment sales. Instead, the company furnished us with an analysis of receivables at the end of each year, which was simply a statement of the name of the particular customer, and the amount outstanding at the end of the year.

The next request is dated February 3, 1932. It is a written request in this file of documents that has been marked for identification Defendants' Exhibit X-311, entitled "Correspondence re requests (McCann) including letters of Jan. 12, Jan. 13, Jan. 19, Feb. 3, Feb. 8, Feb. 9, Feb. 11, Feb. 26, Feb. 26, Mar. 8, April 21, May 5, May 6, May 6, Feb. 4, Feb. 8, Feb. 8, Feb. 27, Feb. 15, 1932 (Touche, Niven & Co.)." There are two items here that were not answered, or were not answered in the manner in which asked. The first item appears as item 3 of that letter, asking for plant appropriation, years 1924 to 1930, inclusive. The second item was item 8, amount receivable by years on unexpired license contracts of Electrical Research Products, Inc., as of December 31, 1930, together with probable cost of servicing such contracts.

Item 3, plant appropriation, years 1924 to 1930 could have been used to ascertain the following information: first, they serve as a check against plant additions as shown by the books, to determine whether all expenditures for plant have been properly capitalized, or any portion thereof charged to expense.

Second. They disclose the purpose for which the new plant is being built, and thereby reveal the character of [fol. 7487] plant as between one class of business or another, and as between Bell or non-Bell business.

Third. They disclose whether the new plant is being constructed to replace existing plant, and thereby serve as a check against the plant requirements, as shown by the books.

Fourth: They disclose whether the new plant is for future development, or for presently used and useful property.

I received two replies in writing to that request. Under date of February 9th, the company advised me with respect to this item: "We will advise you later with respect to this request." Under date of February 11th, the company stated, "We decline to furnish for examination data with respect to plant appropriations, years 1924 to 1930, inclusive." I am reading from letters that I received and that are in this exhibit.

The last quotation was from letter of February 11th, from the Western Electric Company, signed by Mr. Gregory, comptroller. I have not had any of that information.

In respect to item 8 of that request, a letter received from Western Electric Company under date of February 26th shows the complete interchange of correspondence relating to this particular item. The final answer of the Western Electric Company is contained in the last paragraph of that letter, which states, "We have no information, and we do not propose to make any estimates, of either (1) the revenue which will be derived in subsequent years from the contracts in force on December 31, '30, or, (2) the probable cost to Electrical Research Products, Inc. of furnishing the service required under the contracts referred to."

The next item is a letter dated March 8, addressed to Mr. R. H. Gregory. That letter asks for six items. I did not receive item 1 and item 5. Item 1 was a copy of the option agreement. Item 5 is correspondence with and statements showing findings of the Internal Revenue Department relative to federal income taxes of the Western Electric Company and its subsidiaries for the years 1924 to '30, inclusive.

If the information had been made available to me, I would have used it for the following purposes:

[fol. 7488] 1. To determine whether there was any additional liability on the part of the company for federal income taxes for prior years.

2. To determine whether there was any refund due to the corporation on account of taxes paid in prior years.

3. The findings of the Internal Revenue Department may disclose transactions of a special character which are not otherwise brought to the attention of the auditor.

4. The findings frequently disclose the manner in which profit is taken up by the corporation on installment or deferred payment sales, and gives the auditor a base from which to form his own opinion.

5. The findings also frequently disclose the manner in which a corporation treats items of a capital nature, such as plant additions and patents.

6. The findings also disclose any items of expense disallowed by the Internal Revenue Department. The importance of this disclosure is that it brings the items to the attention of the auditor, and thus gives him the opportunity to pass his own judgment upon them.

The next document in this exhibit is a letter to the Western Electric of April 21, 1932, as follows:

"Will you kindly make available for our examination the working papers showing detail by years underlying Defendants' Exhibit D-61, entitled 'Analysis of profits on business other than with Bell Telephone Company from 1881 to 1927, inclusive.'"

I received a reply to that under date of May 5, 1932. I was furnished with a statement showing analysis by years of the profits shown by Exhibit D-61. This was not the information that we requested. We requested the working papers underlying the exhibit, not an analysis by years. The working papers of Exhibit D-61 might have been used for two purposes—to determine (1) the extent to which the non-Bell profits remained in the business to the opening date of Mr. Gregory's Exhibit A-79, referring to non-Bell assets and (2), the extent to which the non-Bell profits of the Western Electric Company contributed toward the amount received by the A. T. & T. in 1920, from the retirement of 146,050 shares of preferred stock which the A. T. & T. received in 1915.

[fol. 7489] The shares referred to represent the preferred stock which was received in 1915, together with an equal number of common shares in exchange for the common stock of the Western Electric which the A. T. & T. then held.

There was no reply by me in writing to the letter of May

5th, 1932. I called Mr. Gregory on the telephone in the afternoon of May 6th, and he informed me at that time that the working papers underlying Exhibit D-61 would be furnished in Chicago if counsel approved.

The next item in this exhibit is a letter dated February 4, 1932, addressed to American Telephone & Telegraph Company as follows:

"We have been requested by Mr. Goldstein to obtain from you a statement showing details of all rate increases and revenues received therefrom in towns of over 25,000 by companies for the years 1923 to 1930, inclusive."

We received a reply from the American Telephone & Telegraph Company under date of February 8, 1932, signed by Mr. C. A. Heiss, comptroller, in which he states, in part: "I have referred this request to our legal department, who advise that this request should be declined."

I do not know anything further about that. The next item in my exhibit is a letter dated February 8, 1932, addressed to the American Telephone & Telegraph Company.

Item 2 and item 8, in that letter I did not receive. Item 2 is Executive committee authorizations for allotments, stock, loans and so forth, years 1920 to 1930, inclusive, and Item 8 is investment in stock of Western Electric Company, showing acquisition by number of shares, and cost, from January 1, 1906 to December 31, 1915.

Under date of February 27, we received a reply from the American Telephone & Telegraph Company, signed by Mr. C. A. Heiss, as comptroller, the next document in this exhibit. The answer to question 2 is "The Attorneys for the City of Chicago are familiar with this company's position regarding the furnishing of proceedings of our Executive Committee."

The answer to item 8 reads in part, "We are not furnishing data for predecessor company covering period 1906 to 1915." Without the information as to the cost of the Western Electric stock acquired by the American Telephone [fol. 7490] & Telegraph Company prior to 1915, we are unable to substantiate the cost to the American Telephone & Telegraph Company of its stock investment in the Western Electric Company as of December 31, 1915.

(Defendants' Exhibit X-311 and Defendants' Exhibit X-305 and X-306 identified by Miss Galster, offered and received in evidence.)

(Plaintiff's Exhibits A-220 to A-221 identified by Miss Galster on cross-examination, offered and received in evidence.)

Cross-examination.

By Mr. Thompson:

I have now stated all the information that has been in any way denied and of which I now complain. This is the complete story.

With respect to the letter of January 12, 1932, the fourth specification "Basis of profit on deferred payments on installment sales, that is, a description of deferred receivables" I was not seeking by that request the amount of profits on deferred receivables. I was simply seeking the basis upon which they were handled by the Electrical Research Products. I should say that the request was made by myself and by counsel jointly. That is, we did want the information on Electrical Research Products.

"Q. When you made the request, did you know that Mr. John E. Otterson, the president of the Electrical Research Products, had testified in a deposition for and on behalf of the defendants, in either late December or early January, as to the exact basis of profit of Electrical Research Products on deferred payments?

A. I knew he had testified but I was not familiar with what he had testified to."

I saw an abstract of Mr. Otterson's testimony. Whether I saw it before or after the date of this request I don't know. I received so many things that I couldn't say whether it was before or after.

I have received so many things that it is difficult to pin down to one particular item. As to whether I have been in any way hampered in my work by failing to know the basis of profit on deferred payments on the installment sales, of the Electrical Research Products, I think it is obvious, if I ask a question, I have a certain purpose. I wanted to know the facts, I wanted to get it in writing from [fol. 7491] the company. I did not have it directly as such under oath from the president of the Electrical Research Products. I mean, I don't know whether I had that testimony, or abstract, at the time I wrote this letter, or not.

I am not familiar with the questions that Mr. Goldstein

put to Mr. Otterson. It might be said with respect to this particular item that I was seeking to get the information without respect to whether it had been obtained through other sources. I can't say whether I requested a great many things that were duplications. I tried, in so far as possible, to get answers from the accounting executives.

"Q. I see. Your proposition was that, although the information had been furnished thru the legal department of the plaintiff, that what you wanted also was to get the same information from the accounting department, is that correct?

A. I was making an independent investigation."

I was not familiar with everything that had been furnished through the legal department.

I wouldn't say I was doing the whole thing over. I may have overlapped on certain items.

Our request letter of February 4, 1930, in X-311 reads as follows:

"We have been requested by Mr. Goldstein to obtain from you a statement showing details of all rate increases and the revenue received therefrom in towns of over 25,000, by companies, for the years '23 to '30, inclusive."

That request was denied.

This has no relation to X-79 whatever. I did not ask the American Telephone & Telegraph Company to give me access to the records which show this. I wanted them to get up a statement showing the details of all rate increases "And the revenue received therefrom in every town over 25,000, throughout the United States, by companies, for the years 1923 to 1930." I didn't know when I made this inquiry whether it would be given to me.

I am not familiar with rate schedules.

(Rate schedule, for the town of Peoria, Illinois, taken from the file of the Illinois Bell Telephone Company, marked as Plaintiff's Exhibit A-226.)

There appears to be forty-five different rates for exchange service only on that rate schedule. I don't know [fol. 7492] whether the inquiry was or was not limited to exchange rates. I made it at the request of counsel. I think the letter speaks for itself.

I had no idea what would be furnished or whether there

would be furnished, if this request was complied with, not only the exchange schedule of every city of over 25,000 people throughout the United States for this eight or nine-year period, but also the toll schedules.

I don't know how many towns in the United States there are with over 25,000 population served by the American Telephone & Telegraph Company and its subsidiaries. I don't know whether it is over three hundred.

I have already stated that I made the request at the request of counsel.

I didn't know whether the request would be refused. I made it because I was asked to make it. Mr. Goldstein did not say to me what his purpose was in making this request. I didn't know whether to get the revenue received therefrom, would require a regrade study. I am not familiar with it. I do not know now. I do not know it to be a fact that when you attempt to get the revenue received from increased rates, that there is regrading, that is, that subscribers go from one service, where the rate is increased, to a lower grade of service, and that it would have required a study of weeks in each of those exchanges to have furnished the information.

I do not know about rate schedules or increased rates, or what they have to do to find out how much revenue comes from increased rates. I am not familiar with any of that at all. I am not familiar with telephone accounting at all. Mr. Goldstein did not tell me why he wanted this information.

The request did not appear so ridiculous to me that I did not want to make it in this letter, and sign Touche, Niven's name to the letter, with the statement that I had been requested by Mr. Goldstein. The reason I wrote that letter in that particular fashion was because I personally did not want the information. I did not know what is was to be used for. I had no knowledge of how much was to be furnished or whether it would be furnished.

As to No. 8 of the letter of February 3d, "Amount re-
[fol. 7493] ceived by years on unexpired license contracts of Electrical Research Products, Inc. as of December 31, 1930, together with the probable cost of servicing such contracts" I don't recall whether I had some conversation with Mr. Gregory about this request. I believe that these are the servicing contracts on moving picture reproduction ma-

chines that are in theaters scattered throughout the United States. It is not a deferred receivable item at all.

The conversation with Mr. Gregory was substantially as follows: I went to Mr. Gregory and said "I have a request here," and Mr. Gregory looked at the request and said, "There are three things about that that make it impossible for us to do it. The first is, these contracts run for ten years in the future, some of them, and we don't know the payments that will be made under them by these moving picture theaters. Second, we, of course, don't know the probable cost of servicing in the future, because the expense incident to it may change. Third, we don't know how many of these theaters will be in existence during the unexpired life of these contracts," and that under the circumstances, it was impossible to make such an estimate; that if it were made, it would be a mere guess, and worthless. I don't know that I made any statement as to whether I agreed or disagreed with him. There was no reason to protest. He stated his position, and the matter was dropped. I said to him I could not see any relevancy that this request had to anything in this case, so far as my figures were concerned. What counsel wanted to make of it, I didn't know. I don't know whether I agreed with him, either by direct statement or by implication, that when the statement was prepared, it would not mean anything. I don't deny that the conversation took place. I don't think that it is, strictly speaking, an accounting matter. I wouldn't say that from the standpoint of dealing with the facts and the figures, a statement of that kind, if it were prepared, would mean nothing. It would give some estimate of what the future earnings on those contracts would be. I could not make that guess, just as well as anyone else. What I expected was an accounting officer of the Western Electric who was familiar with the conditions, to make that guess for me. The number of these theaters to be in existence during this ten-year period, would be in-
[fol. 7494] volved in it. He has past experience to go by, as to what the cost of servicing would be, eight and nine and ten years from the time he was making the estimate. The cost of servicing was involved in it. I don't know whether the prices the Western would charge in the future would be involved in it or not. I have testified about the refusal of the Western Electric Company to furnish plant appropriations. I don't know that they were estimates made by the Board of Directors of what will be required during the

current year for plant requirements. I never saw them. I said what plant appropriations in general could be used for. I didn't say what the plant appropriations of the Western Electric would show. I do not know what they show. I never saw them.

The information on Exhibit A-227 was furnished to the defendants in this case by the Western Electric Company. I don't know when. I don't know whether it was furnished at the time I made the request for these plant appropriations. It was not furnished directly to me. I received it sometime subsequently. I saw it long before I prepared the exhibits which I put in in this case. That statement shows by each of the years 1916 to 1930, the net increase in plant divided between land, buildings, service, equipment, machinery and small tools, and furniture and fixtures, and the total. I believe that it gives the opening entry as of December 31, 1915, and the closing entry as of December 31, 1930.

We made no request of the Western Electric Company to examine their books as to what actually had been done about additions to plant in any way. The only request is the one referring to appropriations. In other words, I had a statement made up by the Western Electric Company that showed, by accounts, for each of the years involved in this inquiry, the additions that had been made to plant, but I wouldn't say that I had free access to the books of the Western Electric Company to find out whether that statement was true or not. I don't think we understand each other on the term "free access." Free access to me, means that I have the right to look at any book, without making a formal written request, and having it passed upon by counsel.

I don't say that I expected that I could go down to the office of the Western Electric Company in New York, and [fol. 7495] see anything that they had and determine myself whether it related to this controversy or not. I am simply defining my interpretation of "free access."

As an accountant the ordinary and normal course when I am examining records is, that every book, record, paper, correspondence file, whatever it may be, is to be absolutely at my free disposal, if I think it relates to the subject matter I am examining. I am to determine what relates to the subject matter that I am examining. The company, whose records I am examining, doesn't get an unqualified certifi-

cate if they object. I don't know what requests I have made would relate to X-79. This plant appropriation might, and it might not. The plant appropriations of Western does not relate to the earnings of the Electrical Research Products but they might relate to the assets of Electrical Research Products. Heretofore when asked about whether I would certify or not, I said so many elements entered into it that I could not answer the question.

I don't believe it is a fact that I was taken off the witness stand, and came back the next day and said that I could not certify to that statement, because I had been denied information.

If you want to know definitely why I wouldn't certify X-79, it is simply because I did not have free access to all of the books, documents, papers, correspondence, and everything that related to the company. I think that my testimony this morning covers everything that I was denied, or refused access to, that had any relation whatever to the work I did on X-79. I think they are all here.

Item 4, "Basis of profit on deferred payments on installment sales" in the letter of January 12th, related itself to X-79. I seriously advance that. What I was doing in Exhibit X-79 was to show the profit from operations of the Electrical Research Products, Inc., and the percentage of return for the years 1927 to 1930. What I wanted to know in this request was the basis of profit on deferred receivables. The books were open to me, the letter so states. The letter dated February 9, 1932, states that I was given full access to Erpi's books, but when I asked for the books I had to mention specific instances and specific books. I don't call that free access. The journal entries, the cash books and the ledgers were all turned over to me for my [fol. 7496] examination, as requested by me for specific ones. I don't know whether I got them all or not. My complaint is that you said I had free access, and I said I didn't.

Besides item 4, wherein I was denied access to information that underlies Exhibit X-79, there was the correspondence with and filings of the Internal Revenue Department, in so far as they relate to Electrical Research Products. Also there is Item 1 of the same letter, which asks for copy of an option agreement sold by Western Electric Research Products, Inc., in 1927. I am not familiar with what took place in court and do not know that when Mr. Gregory was

on the witness stand on the 24th day of March, that Mr. Goldstein requested a copy of that option agreement, and was advised that it was on the train here, and that it was furnished to him the next day.

I don't know whether everything contained in that Number 1 request was testified to by Mr. Gregory on the witness stand under oath. I don't know what he testified to. At the time I made this request, I don't think anything had been testified to in respect to that.

"Q. I see. What you are doing, then, you are not giving what has finally been denied, or the information that they haven't got, but you are just giving what was denied to you?

A. I can only testify to those facts of which I have personal knowledge.

Q. Didn't you go over this carefully? Is it not the purpose of this to show what had ultimately been refused?

A. The purpose was to show what had been refused me.

Q. All right. And that is as far as you go?

A. Yes."

As to whether the foregoing are all the things that could possibly relate to X-79, Item 8 of this letter of Feb. 3rd might or might not. I don't know, I was not furnished the information. I cannot pass upon it. The denials of information underlying D-61 may or may not be involved. I do not know that they are not involved. Those were the details that had to do with the non-Bell profits of the Western, prior to 1925, and I excluded in my Exhibit X-79 any consideration in anything excepting Erpi's operating profit. [fol. 7497] D-69 couldn't have had anything to do with it, except so far as allocation between Bell and non-Bell is concerned. I do not make any allocation in D-61 between Bell and non-Bell, but D-61 is tied up with the dividend paid by the Western and the Electrical Research in 1927. I made the statement that D-61 might or might not have some bearing on it, I don't know. I never saw the working papers underlying D-61 when I made my study.

In Exhibit X-311, a letter dated February 15th, is as follows:

"Verbal request made about 12:00 midday. Informed at 3:15 to put through written request. Request put through at 3:55. Asked about three times between 4:15 and 5:30.

informed at 5:40 the men had gone home who handled the folder. Received the folder at 10:00 a. m., 2-16-32."

If all that I say there is entirely accurate, I had a delay in the matter from noon of the day until ten the next morning. That is the only delay I have listed in this exhibit X-311.

There are several delays, but they are not all reduced to writing. I am not claiming anything with respect to those delays.

June 20, 1932.

I said previously that the failure to give the plant appropriations of the Western from 1924 to 1930 might have affected the work that I did in connection with X-79. Since I have not seen the plant appropriations, and I do not know whether they cover the Western and subsidiaries, or only the Western, it is pretty hard for me to give a definite answer as to how the failure to get the information would affect X-79. The plant appropriations were asked for as to the Western only, but still, I do not know whether the plant appropriations would cover subsidiaries or not.

"Q. How could it possibly have affected the situation with respect to Exhibit X-79? There you were only including the average investment of the Western in the Electrical Research Products, which did not include any plant investment at all, and you were only ascertaining the earnings of the Western Electric Company on the original dollars invested by it in Electrical Research Products.
[fol. 7498] A. The Electrical Research Products has a certain amount of plant."

I did not ask for the plant appropriations of Electrical Research Products, Inc.

If these plant appropriations of the Western Electric Company only covered the Western Electric Company, it would not affect Exhibit X-79. That is all I asked for.

I testified about a refusal of a request to give us the basis of profits on deferred payments, on installment sales, that is, a description of deferred receivables. That request was made on January 12, 1932, I think. I have not the letter in front of me. To what extent Mr. John E. Otterson had testified in connection with that particular matter in January 1932, I didn't know, because I never made a very

thorough examination of his testimony. I said I had seen an abstract of Mr. Otterson's testimony before I was on the witness stand. I was here saying that not only had there been a refusal to furnish this information, basis of profits on deferred payments, but possibly it might have interfered with my work in the preparation of Exhibit X-79.

(Counsel reads from the deposition of John E. Otterson, on redirect examination by Mr. Goldstein taken January 13, 1932):

"Question: Mr. Otterson, you stated at the previous hearing that there were four classes of transactions: So that we may have it correct, I will ask you if you stated that one is the outright sale of equipment; the second is sales of equipment on the installment plan; the third, the licensing or renting of equipment where title to the equipment is retained by the Electrical Research Products, and fourth, royalties received for the use of processes. Are those four classes of transactions correctly stated?

Answer: I think so.

Question: Are there any other classes of transactions by the Electrical Research Products other than those four mentioned or does that include the entire system of activity of the Electrical Research Products Company?

Answer: May I have that other question read?

Answer: I think those cover all the activities. I do not think, however, that is a complete statement.

Question: But in a general way, that covers it?

[fol. 7499] Answer: Yes.

Question: With reference to the sales of equipment on the installment plan——"

(Testimony of witness):

That is the thing we are talking about.

(Deposition continues):

"—the purchase price of the equipment, as I understand it, is entered as in the year in which the sale is made, is that correct?

Answer. Yes.

Question. Is the entire amount of the purchase price of the sale of equipment which is sold on the installment plan, considered as income in the year in which it is sold?

Answer. Yes.

Question. In other words, if a piece of equipment for $100,000 is sold, payable over a period of years, you enter the $100,000 for accounting purposes as income in the first year?

Answer. That is right.

Question. And the entire expense including the cost of the equipment is deducted in the first year against that income?

Answer. Yes.

Question. Now, with reference to the third class of equipment, that is the equipment where the title is retained by Electrical Research Products, and a license given for the use of that equipment over a period of years, are the license payments—the entire amount of license payments called for by the contract, entered as income in the first year?

Answer. Yes, except where the payments relate to service and not to apparatus. That is where the services are to be performed later.

Question. To get that picture clearer, will you give a concrete instance of one transaction of that sort, a typical case?

Answer. Well, if we sold equipment to a theater, that will be sold generally on a ten-year lease. The payments on account of the apparatus itself would be spread over a three-year period. The payments on account of the service is spread over the ten-year period. The entire payments which are due over the three-year period on account of the [fol. 7500] apparatus, are taken up on the books as income in the year of sale or installation and the expenses in connection with the cost of that apparatus are also taken up on the books at the same time, and the profit that will be indicated during that year as related to that transaction, will be the difference between those two. The amount of payment which has not been made at the time, are carried as receivables. The service charges are taken up as they are received during the year in which the service is rendered."

(Witness continues):

From what has been read, it is apparent that the basis of profits on deferred payments are clearly and perfectly stated in this record by the sworn testimony of the presi-

dent of the Electrical Research Products, Inc., on the 13th day of January, 1932. I knew that that testimony had been given. I did not know when it had been given. I knew it had been given. I did not know exactly what the testimony covered.

In answer to the question as to whether my work was interfered with I say that I did not get an answer to my letter, and I assumed from the failure of an answer to my letter that they were not furnishing me with that information. I had no knowledge of what any of their officers had testified to. I was in New York and the lawyers in the case were here in Chicago. I didn't even know that the deposition was taken in New York. These requests for information were not all approved by counsel. I think they knew I was making this request for the information about the deferred payments, but I would not be sure. I think they knew I was making it.

My letter in connection with the basis of profits on deferred payments was January 12, 1932. In the accounting of the Western Electric Company I believe that deferred receivables and deferred accounts receivables are two different classifications. On January 19th, as shown on the third page of this letter, Mr. Gregory sent me a statement showing, by years, an analysis of deferred receivables on monthly report No. 1. In his letter he said:

"In addition to the item known as the deferred receivables, there are deferred accounts receivable covering deferred payments on sound picture installations, not due. [fol. 7501] Those are included in monthly report No. 1, accounts receivable, as follows:

And then he sets them out. They run from six to eight million dollars for 1928, 1929 and 1930. After that I did not request further information from Mr. Gregory in connection with this subject matter.

"Q. In other words, the situation about which you complain is this: He sent you a list of what were the deferred receivables, the exact thing that you had inquired about, and then he told you that there were deferred accounts receivables, and gave the amount of them, and you made no further inquiry about it?

A. I think I made a verbal inquiry, but I do not recall just now what I did say.

Q. It is further a fact that you know there was a misunderstanding about this, and that on January 9th—no, on February 11th, Mr. Gregory wrote you on a letter that is contained in your Exhibit X-311, referring to another item that you were inquiring about as shown by your letter of February 9, 1932, an analysis by years of accounts receivable and so forth, that 'With respect to that item, we understand that you are changing these requests. You may therefore consider the answers given, namely, on February 9th, as withdrawn, pending the receipts of further information from you.'

Did you ever give him any further information about it?

A. I do not think the two things are exactly related.

Q. No, I know they are not, Mr. McCann, but there were three things here: There were deferred receivables, deferred accounts receivable and these future payments due on account of services, and I am asking you if it is not a fact that there was a clear misunderstanding between you and Mr. Gregory about it, and that after that misunderstanding developed, you made no further request for any information?

A. I do not think that is a statement of facts, because there is a letter of February 26th, in which——

Q. All right. Is it here?

A. It is. Our letter of February 26th, to the Western Electric Company, and Mr. Gregory's letter of February 26th, addressed to us.

Q. Is this letter of February 26th a repetition, in your [fol. 7502] opinion, of the request No. 4 in the letter of January 12th?

A. No, it is not."

I have stated that I made a request under date of February 8, 1932, which reads as follows:

"Executive Committee authorizations for allotments, stock purchases, loans and so forth, for the years 1920 to 1930, inclusive."

Referring to the language, "and so forth"; it was my position that I should be allowed to examine, pursuant to this request, all of the executive committee authorizations of the American Telephone & Telegraph Company. Apparently the substance of this request was that the entire minute book of the executive committee of the American

Telephone & Telegraph Company should be turned over to me for my uncontrolled inspection. By "uncontrolled," is meant not that I should take it away, of course, but that I should have the perfect right to examine anything contained in the minutes of the executive committee. That was denied. I am not familiar with the situation as to whether the minute book for that period of time was here in Chicago, when I testified on Saturday and that the court was to determine which of the minutes of the executive committee were properly admissible in evidence here. I knew there was some discussion about the minute books.

In regard to my statement that there was a refusal to furnish copy of an option agreement sold by the Electrical Research Products, Inc. in 1927, that request was made under date of March 8th. I do not know that I understood that I was advised orally by Mr. Gregory, that he was soon to be on the witness stand, and that counsel for plaintiff had advised Mr. Goldstein that these requests would be answered from the witness stand by Mr. Gregory.

Mr. Gregory talked to me about this request and my impression was that the whole thing was to be referred to counsel. He may have mentioned the witness stand and he may not. I am not certain of that. I understand that Mr. Gregory went on the witness stand and did on March 25, 1932 produce this document that I have indicated a refusal to produce here. I knew that before I went on the witness stand. I knew also that he had testified in open court in the latter part of March. I did not know the exact nature of his [fol. 7503] testimony. I was told by counsel that he had testified about the option agreement.

(An instrument which has been identified as D-61 was marked Exhibit A-227.)

This exhibit is an analysis of profits on business other than the Bell Company from 1881 to 1927, inclusive. I have seen that instrument before. I did not know when it was furnished. I assumed it was not an exhibit that the plaintiff had introduced or offered in evidence in this cause, because it was not so identified. After that paper (Exhibit A-227) had been furnished to Mr. Goldstein, there was prepared by the Western Electric Company and delivered to me at my request an instrument which was originally marked Exhibit X-102, and which is now identified as Exhibit A-228.

(Document marked Exhibit A-228).

That instrument shows an analysis of the profits of business other than the Bell Telephone companies from 1881 to 1927, inclusive, by years, and groups of years. I do not believe it is a fact that after that had been furnished to me, I requested the right to inspect the underlying data that had been used by Mr. Gregory in the preparation of A-228. I asked for the underlying work papers before I was supplied with the exhibit that you just showed me.

(Document of two sheets was marked Exhibit A-229.)

I have not seen the two sheets identified as Exhibit A-229, entitled "Statement showing analysis of profits on business other than with Bell customers," expressed in dollars of thousands. I could not say whether my men saw them because I do not know. If my men copied these two sheets, it must have been done here in Chicago. I had no knowledge, I never saw those sheets. I could not say whether these were copied or not. I am not familiar with it. If they were turned over to employes of Touche, Niven & Company, and were actually copied, that is not in compliance with my request. I don't know whether that was done or not.

"Q. I will ask you whether you were not furnished in New York for your inspection all of the books and records of all of the subsidiaries of the Electrical Research Prod-
[fol. 7504] ucts—I mean of the Western Electric Company, for the years 1916 to 1931?

A. I was only given those particular books that I asked for."

There never was a refusal to furnish me, at my request, the books or records of any of the subsidiaries of the Western Electric Company for the period 1916 to 1931. I do not think I am complaining of anything. I merely made certain statements in connection with these letters. I do not think that I claim that I was not allowed to examine the books. I think I asked for work papers which were denied me. The entire request was the work papers underlying D-61.

Mr. Hagberg was working on this case for Touche, Niven & Company. I do not know whether or not Mr. Hagberg made copies of these papers, Exhibit A-229.

I did not examine the contract between the Electrical

Research Products and the Gary interests in connection with the granting of an option after that contract had been furnished by Mr. Gregory.

I wanted to see all the correspondence with the Commissioner of Internal Revenue or his representatives, and the Western Electric Company, in connection with the income tax returns of the Western Electric Company, and any differences between the company and the Government with respect to income tax. I was not furnished photostatic copies of all the Western Electric Company's income tax returns for the years 1916 to 1930. I do not know that they were furnished to the City of Chicago. Before this correspondence would have been of any use to me, I would have had to have seen their consolidated income tax returns. I saw the consolidated tax return of the A. T. & T. I do not believe that I saw the income tax returns for the Western from 1916 to 1917. I do not recall seeing them. I have prepared exhibits in this case which show the difference between the Western's income taxes as included in Exhibits A-77, A-78, A-79 and A-80 and the amounts allowed by the government for the years 1916-1930. From 1918 to 1930 the figures were taken from the consolidated tax returns. The figures from 1916 to 1917 I got on statements supplied by the Western Electric Company. I had the information [fol. 7505] anyway as to the amount of taxes. I was also furnished with the complete reconciliation statement of income taxes. It appears to consist of twenty-two sheets.

From the use of the consolidated income tax returns of the American Telegraph & Telephone Company and the Western for the years 1918 to 1930, and by the use of the separate returns, or statements in connection with that company, for the Western, for 1916 and 1917, and this reconciliation statement, it was possible for me to tell the difference between the amounts claimed by the Western as in Exhibits A-77, A-78 and A-79 and A-80, and the amounts allowed by the Government for income tax purposes, in so far as those claims had been settled. For the years 1924 to 1930, the fact that there was a reconciliation did not necessarily mean that the thing was settled one way or the other. So far as they had been adjusted between the company and the Government, I had the complete information as far as the figures were concerned.

My Exhibit X-79 was prepared probably the latter part of February. It was one of the last exhibits. That exhibit

was based exclusively on certain information that had been furnished me by the Western, consisting of monthly report No. 1, and an analysis of principal items appearing on the Products Company No. 1 report for the years 1927 and 1931, which had been furnished by the Western to the defendants in this case, and which have been identified in this case as Exhibits D-74 and D-75.

(The document was marked Exhibit A-230.)

I believe that the information contained in Plaintiff's Exhibit A-230 is the sole information used by me in the preparation of Defendants' Exhibit X-79, except so far as it affects the earnings of subsidiary companies, which I obtained from another source.

(Counsel reads from previous cross-examination of witness, as follows:)

"Question: Now, it is a fact, Mr. McCann, isn't it, that you know an examination of these records that the Electrical Research Products was largely financed by means of loans made by the Western Electric Company to Electrical Research Products rather than stock issued by the Electrical Research Products itself or by a bond issue?
[fol. 7506] Answer: I do not know that that is a fact. I never studied that phase of the situation."

I remember my testimony in that connection.

(A document was marked Exhibit A-231.)

Exhibit A-231, which is a statement of loans by the Western Electric Company, Inc., to the Electrical Research Products, Inc., was furnished to me in response to a direct request by me in my letter of January 12, 1932. I did not study the information that was given me. I never used this particular statement. I was requested by counsel to obtain the information. I never used this.

In Exhibit X-79, I gave no effect to the fact that Electrical Research Products was financed by loans made by Western Electric Company. I had before me long prior to the time that I prepared X-79, information furnished by the Western Electric Company concerning that matter. If I had wanted it, I had it.

I had no desire to ascertain, in the preparation of X-79, whether the Electrical Research Products was in fact largely financed through loans made to it by the Western.

(Documents were marked Exhibits A-232 and 233.)

I made some statement about the American Telephone & Telegraph Company having denied me information with respect to the amount of stock and the cost of that stock held by it in the Western Electric Company for 1915 and prior years. I would not be absolutely certain whether or not the information in Exhibit A-232 and Exhibit A-233, the first bearing the legend, D-76, and the second D-77, was furnished by the Western Electric Company to the City of Chicago. It was not furnished to me. I believe I saw this one marked A-233 before, but I am not certain about this one marked A-232.

Mr. Whitworth has been in charge of this investigation for Touche, Niven & Company. He is a member of the firm of Touche, Niven & Co. I report to him.

(Counsel reads from Mr. Whitworth's testimony regarding Exhibit X-79 as follows:)

Question by Judge Wilkerson: "You knew you were to be asked to adopt these percentages as indicating the return of the Electrical Research Products. Now, just what is [fol. 7507] your practice, your general practice, where you are confronted with a situation of that kind, and you were denied access to some essential document or some essential book? Is it your practice to make up the papers from those to which you have access and send them in, or is it your practice to advise the court that you have not the necessary papers upon which to make an estimate?

The Witness: It is generally necessary to advise the court that we have not the necessary facts.

Judge Wilkerson: So you had everything which in your opinion you thought was necessary to the ascertainment of those percentages, or you would have told the court you did not have the documents or the books from which to make that estimate?

The Witness: Yes, sir."

I agree with the answers of Mr. Whitworth.

Redirect examination.

By Mr. Haight:

During my cross-examination, my attention was called to the copy of letter addressed to Touche, Niven & Company by Mr. Heiss, comptroller of the American Telephone &

Telegraph Company, under date of February 8, 1932. I believe I received written instructions from Mr. Goldstein, asking me to obtain that information. I believe they were written instructions. I was in New York when I received the request from Mr. Goldstein. Mr. Goldstein was in Chicago. I had no knowledge of what it was all about. All I did was to carry out the suggestions and made the request.

Referring to a letter of February 15, 1932, the last one in the series produced by me, I was asked on cross-examination if the only complaints I had regarding the delays were those listed in the footnote upon that letter. There were other delays.

(Objection on ground that on cross-examination witness said he was not complaining of other delays. Objection overruled.)

I have made a list of other delays. I listed them upon this document, Defendant's Exhibit X-312, entitled "Statement on Delays."

(Same objection as above.)

[fol. 7508] All of these alleged delays are with reference to something I finally got.

(Defendants' Exhibit X-312, marked for identification.)

The delays that I have listed in this document, Defendants' Exhibit X-312 for identification correctly sets forth the details respecting them. When I say I did not get the data, or the information listed, I mean it was not given to me promptly.

I was asked on cross-examination something about the photostatic copies of the income tax return. I also had showings of the final statements from 1918 to 1923. From the correspondence with the Internal Revenue Department, that we were discussing the other day, I would expect to learn the following:

The first thing that I find out from the correspondence and finding is the basis of the final statement that would give me a clue as to the manner in which the items had been treated by the corporation and the manner in which they had been finally disposed of by the Internal Revenue Department. This information would have been useful in determining whether the tax returns for the years 1924 to 1930 gave effect to these final adjustments made by the Internal

Revenue Department, or whether the tax returns had been left as they were originally prepared. The final settlement was up to and including 1923. With regard to making a certificate respecting any of the things that I investigated, we have not, in respect to any of them, made what I, as an accountant, would call an audit. We do not give certificates short of audits.

(Counsel reads from the deposition of John E. Otterson on cross-examination as follows:)

"Question. Have the books and records of the Electrical Research Products been audited?

Answer. Yes.

Question. By whom?

Answer. Arthur Young & Company.

Question. Are there copies of that audit in the possession of the Electrical Research Products?

Answer. Yes.

[fol. 7509] Question. And have those audits been made for each year, 1927, 1928, 1929, 1930 and 1931?

Answer. For all but 1931. Their auditors are currently and constantly in touch with our accounting department."

And then by Mr. Goldstein:

"Question. Mr. Otterson, to avoid asking you to produce detailed statements covering those various transactions, both as to income and expenses, we would like to have you produce the audits of Arthur Young & Company covering the years 1927 to 1930, inclusive."

By Mr. Thompson:

"We will take that request under advisement. I do not presently see any objection to your having them, but we will let you know definitely a little later."

"Mr. Haight: That was upon the 16th of January, 1932. Anyhow, afterwards, after we had left New York and had gone home, we were advised, as I understand by Mr. Bracelen, counsel for the A. T. & T., that there were no such audits, but there were statements verifying the investment; merely a verification of the Western Electric Company investment, as I understand it.

Mr. Thompson: There was a certificate to the balance sheet. Are you talking about the Products Company?

Mr. Goldstein: Yes, we are talking about Mr. Otterson's

statement under oath that there was a complete audit—there was an audit for that year, for each year, and on the basis of that we asked no further questions about the deferred receivables. He said an audit for each year, and his statement is under oath, and it is the same oath under which he made the other statement.

Mr. Thompson: We will debate that.

Mr. Goldstein: Yes. And would you also read that statement of Mr. Adcock where we called their attention to it in open court, at the deposition. Mr. Adcock made a statement that ought to be in the record.

Mr. Haight: And also on page 791 of the deposition, by Mr. Adcock:

'At the end of Mr. Otterson's redirect examination, we requested the audits of Arthur Young & Company of ERPI which Mr. Otterson testified had been made by Arthur Young & Company and I think the letter of Mr. Bracelen of [fol. 7510] January 19th, states, as a matter of fact, that there were no audits made and that request——

Mr. Bracelen: Did I say that?

Mr. Adcock: There were no reports made, yes, no reports made, and we wanted the audits made at that time, as stated by the record, in order to save time, and for that reason we probably want to recall Mr. Otterson to ask some questions about that situation, not particularly about the audits, but with reference to the subject matter that will be covered by the audits.'

And then there is a considerable wrangle that I will not stop to read. It will be all in the depositions."

Recross-examination.

By Mr. Thompson:

After I had left the witness stand on Saturday, I had a conversation with Mr. Gregory here in the courtroom. I didn't tell him that Touche, Niven & Co. felt that they had wonderful cooperation from the Western in their work. I do not recall what I said. I didn't say that we had fine cooperation.

As to this first alleged delay, I stated "under date of December 29, 1931, we requested the analysis of 1925 cost of sales and supporting details." This information was furnished us under date of January 8, 1932. What I did in this request on December 29, 1931, was to ask for the 1930

and the 1925 analyses of cost of sales. On the same date, that I requested the two, the 1925 and the 1930 cost of sales, the Western Electric Company delivered to me the 1930 costs of sales. They were parts of the same request but were separated by your representative of the Western Electric. The fact is on the day when I asked for the 1925 and the 1930 analyses of cost of sales, the 1930 analysis of cost of sales was delivered to me, and I was advised by the Western Electric Company that their men were engaged in working on the 1925 cost of sales analysis. I believe it is correct that they said that as soon as that work was finished, the other would be delivered to me. They told me they were working on it, or finishing it. As to whether I objected to it or protested against it, why should I protest. I merely asked for it. The first thing that I list here on this, were statements that had been prepared by Mr. Gregory, contained in folders perhaps an inch or an inch and a half thick. I don't know whether the 1930 analysis of cost of sales which [fol. 7511] I had, showed the exact manner and method that Mr. Gregory had followed in both studies.

"Q. Now, Mr. McCann, tell me one place in any exhibit in this case where you have used one thing that was taken from either one of these analyses of cost of sales, 1925 and 1930.

A. Well, I think the cost of sales of 1925 and 1930 enters into every exhibit where these particular years are involved.

Q. All right.

A. Whether I used the figures or not.

Q. Tell me what part of that analysis of cost of sales entered into it, or whether you used that in the preparation of these exhibits.

A. Whether I used it or not, I do not think enters into the question. It enters into the profits, and I did use your profits as a beginning point.

Q. I understand. I am asking you the direct question, whether you used anything—whether you used in any of the work that you did in this case the information contained in these folders, as there contained.

A. I believe I did.

Q. In what exhibit and how?

A. In practically every exhibit as to the Western.

Q. I want your working papers this afternoon, and I want you to point out on those working papers any place where you used any information that was contained in the 1925

and 1930 analyses of cost of sales that was not available to you in the binders that you inspected. I would like to have a written statement on that.

Mr. Haight: All right."

When I made a joint request for two folders containing the analysis of cost of sales for 1925 and 1930 on December 29th, and I come into this court with the statement which showed that I was denied one, I do not see that it is necessary to make a statement about the other having been furnished to us on the date the request was made.

[fol. 7512] W. M. HAMMOND, a witness on behalf of defendants, having been previously duly sworn, resumed the stand and further testified as follows:

Cross-examination.

By Mr. Blackman:

June 20, 1932.

Throughout my exhibits I used the bond rating, such as triple A, double A, single A, BA and BAA, and so on. These ratings and the data that I testified about were taken from Moody's, principally. I do not know what considerations underlie any particular rating which Moody gave to any of the bonds that I use in my tabulation. If I understand your question rightly, I do not know all of the considerations, and I am not conversant with the weight given by Moody to different elements or all of the elements that are considered. As to whether it is necessary to know that in order to make the proper comparison, I say I have not drawn comparisons as to any particular companies. I followed the thoughts somewhat that Mr. Hoyt has expressed in this record, that they are generally recognized in the financial world and by many investors and by banking institutions as indicative of the investment value or quality of bonds. I have compared triple A bonds of the Bell System, as you designate them, with triple A bonds of railroads, and triple A bonds of industries and triple A bonds of other utilities. I have set them up in parallel columns according to the ratings which are found in the manuals and have not attempted to draw any conclusions of my own as to the elements of comparability between the dif-

ferent classes. I would say that there are probably other elements than that of safety that are involved in Moody's ratings. I do not know what those elements are. You would have to examine the history and status of each company in order to make a statement in that regard.

As to my understanding of the requirements necessary for a bond to be rated as triple A by Poor or Moody, I have made no specific study as to the bases on which the ratings are assigned. I know that in the financial market they are rated as the highest-grade bonds. If the assets of [fol. 7513] a company were two or three or four times the amount of the principal of the bonds in question, and of bonds ahead of them, if there were any ahead of them, I would say those were high-grade bonds, but I would not attempt to draw a distinct line between the said statistical factors; there are other factors than those, that can be expressed statistically that may enter into the salability and consequently the rating on the bonds. Moody does rate many bonds as triple A.

I have expressed nothing in my report indicative of a conclusion as to whether triple A bonds are all equally well secured or equally well thought of, or a conclusion of that kind. If you took a bond that is earning its interest charges four or five times over; the company is a prosperous one; well managed, growing; its assets are three or four times the amount of the bonds; and the bond is a first mortgage bond—in that case I would expect to find that bond given a high rating. I would not draw a conclusion based on the data which you have given me as to whether it might be a triple A or a double A. Assuming that it is a triple A, other factors being equal, another bond that was paying its interest rate eight times over, and secured by property that was eight times the amount of the face of the bond, would have somewhat better quality. There is no exact statistical data that can be used, to my knowledge, to define clearly the distinction between triple A and the next grade below. If a bond were earning its interest charges six or seven times over, and the company was a good company, and a growing company, if you ignore all other elements, I could give no opinion then—without considering something more than one element. Ordinarily the asset position, or equity, has a bearing upon the values. If it has one added factor—that is it has assets, of five times the face of the

bonds, the bond is a first-mortgage bond, that is, the assets are four or five times and the interest charges are five or six—I would expect to find that bond rated among the highest grades. It probably would be triple A, but there are other factors which might have a bearing on it. It might fall into the next grade, which comes very close to the triple A, in general quality.

I would say that cases where I have passed upon the [fol. 7514] issue of bonds the records of the company showed that the bond interest was being earned, or would be earned six or seven times over, are not particularly frequent. I don't recall any at this time. The Commerce Commission records may disclose many, but I don't recall any particular case at this moment.

Regarding the security issues that I have passed on, the general average of the bond interest earned would fall between one and three-quarters times, and three times, or thereabouts, some higher and some lower. Those are not merely the upper and lower limits, necessarily.

I wouldn't want to say without further study that a great many bonds do rate as triple-A that are not earning their interest charges more than three times over. A bond earning its interest four times, with other factors strong, probably would fall in the higher grade of ratings, Triple-A, or a grade nearer, Double A. I summarize on my Exhibits X-227, X-228 and X-229, a good many hundred of pages of sheets which I submitted to you, showing the bond averages and prices and yields, and things of that kind.

On these three sheets, I set up in a form in which they could be compared, and make comparison between the yields, as I have termed them, of the Bell System bonds, and bonds of railroads and public utilities. The purpose of putting them there was for comparison and for the purpose of showing the levels as between the different groups.

On Exhibit 229, Bell System bonds, railroad bonds, and public utility bonds are set up in parallel columns.

I would not care to make a general statement as to which bonds show the better yields without adhering pretty closely to the figures.

The way I set up these parallel columns here shows that the yield on the Bell System bonds was better than on the public utility bonds in each of the years 1921-1931 in which I make comparison, except the two years of 1929 and 1930. In the comparison which I make with the railroads, the rail-

roads got better yields in 1923, '24, '25, '29 and '30. In the other years where that comparison is made, I show that the Bell System got better yields as compared with the railroads. The comparison that we have been talking about is the comparison based on the cost to the company, referring to [fol. 7515] the three columns headed "Cost to the Company."

The next comparison I make is made in three parallel columns immediately to the right of those we have been discussing and are under the heading "Yield to the Public." In that comparison, I show that the Bell System bonds were on a lower yield basis, and, therefore, had a better sale than the utility bonds in every year except '21 and '30. If by "better yield" it is meant that the companies were able to sell the bonds at better prices than railroad bonds, so that the charges were less, then that is another question. Then, the answer is, in 1921 the Bell System yield was under the yield of the railroads; in 1922 it was under; it was higher in 1923; it was higher in 1924; it was lower in 1925; it was lower in 1926; in 1927 and '28 there were no Bell issues; in 1929, the Bell was under the railroad yield; in 1930 it was higher than the railroad yield; and in 1931 there were no Bell issues.

In my last comparison, the three figures to the extreme right of the sheet, I compare the spread between cost to the company and average yield to the public. That is taken up principally by the Banker's Commission. In that comparison, it is not correct that the Bell System bonds were less than the Public Utility bonds in every year. In the year 1929, the Bell System is higher than the Public Utilities spread—that is, 33 against 25. In every other year, the Bell System spread is less than the Utilities. With regard to the railroads, the Bell System spread is less in some years, and higher in others.

The same identical figures that appear on Exhibit X-229 also appear on Exhibit X-235; the figures are drawn from the same sources. They appear opposite the line "Average." Taking the year 1929 as an example, in that year the Bell System issued only triple A bonds, and the yield that I have set down for those triple A bonds is 5.33. The yield that I set down for triple A railroad bonds is 4.82, and the yield that I set down for public utility bonds of triple A grade is 4.93. On my summary sheet here, where I make the comparison, I show that for that year, the aver-

age comparison is 5.33 for the Bell System, 5.27 for the railroads, and 5.29 for the Utilities. The figures that I use on X-229, for 1929, in the first column opposite the year [fol. 7516] 1929, and under the heading "Bell System" is 5.33; and in the same line, under "Railroads" is 5.27; and in the same line, under "Utilities" is 5.29.

In Exhibit X-229 for the Bell System for 1929, the yield is 5.33, and in Exhibit X-235, it is the same; for railroads, on Exhibit X-229, 5.27 for 1929; and the same figure on Exhibit X-235; and in X-229, for utilities, for 1929, 5.29, and the same figure on X-235.

I have used the yields, in order to determine the comparison between the railroad bonds and the public utility bonds on the one hand, and the Bell System bonds on the other. I have used only triple A bonds of the Bell System, and I have used as low as BAA grade of railroad bonds. Every grade that was reported is included. In the year 1930, I have used five grades of railroad bonds, and four grades of public utilities, to compare with the one triple A grade of Bell System bonds. They represent the entire financing of each class of business for those years.

I would not follow and I think I have not used the following system:

To compare the goods of Marshall Field with the goods of Carson, Pirie, find that the highest grade stuff in Marshall Field's was rated, at $5, and the highest grade stuff at Carson-Pirie's was rated at $5, and lower grades at Carson-Pirie's at $3, and $2, and even $1, and then add up the Carson-Pirie stuff and find that the average was $2, and say that Marshall Field's prices were two and a half times those of Carson-Pirie.

The difference between that example and what I have done is as follows: This is the weighted average of all of the issues based on the volume of the respective classes, and represents the entire cost for each class of industry for the years that it purports to. It does not necessarily imply that because they are set down side by side, that I mean to infer that each has identical values. They may be compared, I believe, without attributing identical values. My purpose in X-229 was not to draw conclusions as to whether or not the Bell System bonds were getting a better yield or were selling on a better yield basis or had a better market than the railroads or public utilities, but to present the facts that might be helpful in reaching a conclusion. I

[fol. 7517] cannot answer yes or no whether in the summary sheet X-229, I intended the court to understand, and make a finding that the Bell System bonds commanded a better yield, or at least commanded a better price, were sold on a lower yield basis than the utility bonds. The word "intent" there is confusing to me. There was not a purpose or intent, except to present all of the facts, classify these bonds, on the only basis I was aware of, and that is, that which is generally recognized in the investment world as of some value. Beyond that, I have not attempted to express, or attempted to draw a comparison between any particular issues or class of issues.

The triple A bonds of the Bell System are compared with the triple A bonds of the railroads, and the triple A bonds of the utilities in this Exhibit X-235. The exhibits are set up so that if you wish to compare triple A bonds with triple A bonds, you have the figures. I have reached the conclusion that triple A bonds may be compared with triple A bonds. I am not undertaking to say which method shall be adopted. That is for counsel to argue. I cannot say whether, if I had compared the triple A bonds of the Bell System with the triple A bonds of the two other classes, and had used that comparison on X-229, I would have shown just the opposite of what I show here, and would have shown that the Bell System bonds did not command as good a market price in relation to the interest, and that the yield, in order to sell the bond, had to be higher. I would not try to answer that yes or no without reading the figures. I will make up a table and add up the yields of the various years of the triple A Bell bonds, the triple A railroad bonds, and the triple A utility bonds, and tell what the comparison is.

Graphic chart X-227 is X-229 reduced to chart form. That is plainly shown on the face of the exhibit, I believe, or in the testimony. Exhibit X-228 is likewise produced from X-229, based on the figures. The charts are intended to be a faithful reproduction of the figures on the same basis that 229 is built up. The comparison shown graphically on the chart is a comparison of triple A Bell bonds with bonds of other companies, including B's, BA's and BAA's.

[fol. 7518] As I recall, an issue of $219,000,000 of Bell System bonds issued in 1929, I believe, was the only convertible issue of the Bell System included in these exhibits. I don't recall including any convertible bonds of the under-

lying companies of the Bell System. The conversion privilege of the American Telephone & Telegraph issue was a conversion into common stock of the company. I cannot state from memory the exact terms of the conversion.

The convertible privilege has a bearing on the selling cost of the convertible bond. Convertible bonds were excluded from Exhibit X-229, both Bell System and railroads, but they were included in some exhibits set up in parallel columns showing those that are convertible, and those that are not.

I would have to read to you the issues to give you a full answer as to what extent the railroad bonds were convertible. I have a list of them. I haven't the exact figure as to approximately how many were convertible without looking at my papers. I have not reproduced in these exhibits the terms of the convertible features. I examined them, but I did not reproduce them in this exhibit. I don't recall,—there was a long list of them, and I naturally did not attempt to memorize them.

I have produced figures here on the subject of the yields on bonds as compared with the yields on stock, and the yields on one stock as compared to the yield on another stock. I am referring to Exhibit X-250 and subsequent exhibits. In all of those cases I used merely the dividends that the companies were paying. I have so stated on direct examination. In no case did I take into account, or give any weight to the earnings of the company. We would not know from my figures, and my figures would not be changed, if two companies were each paying 8 per cent, whether one of those companies was earning 6 per cent, and paying the additional 2 per cent out of accumulated reserve, or whether it was making 28 per cent and setting aside $20 to surplus, and paying $8 in dividends. I took into account only cash dividends. I am not saying that the companies are comparable.

I have shown a comparison of the yields on the common stocks at the market prices prevailing in each year, based [fol. 7519] on the cash dividends, and for that purpose have grouped together the common stocks of all the utilities that had issued bonds of the different grades; I have also shown the average on the same chart, Exhibit X-250, of all of them combined, and then they are broken down into the Moody's ratings groups.

The only factors that I considered in making the comparisons that I speak of were market prices of the securities and the dividends paid by the companies. I paid no attention to what the companies were earning, and that factor did not enter into my calculations at all. I made my selections of these stocks for comparative purposes by taking the base on which their bonds were selling, where they have been divided into investment groups. The market price of the bonds had nothing to do with the calculation.

A study was made of the common stocks that had an open market, in other words, that were traded in on the public markets; the prices were recorded; the average yield based on dividends being paid were computed. They were grouped where they are grouped in this statement, by taking the companies that had triple A bonds and setting up in a group corresponding, so to speak, the stocks of those same companies, in so far as there was a public market for the stocks. I used the bond basis as the test for determining the comparison of stocks.

Redirect examination.

By Mr. Goldstein:

Referring to Mr. Crunden's testimony in 1929, in connection with which he offered plaintiff's Exhibit 16, appearing in record volume 4, pages 1276-1277, entitled "List of Bonds and Notes of Public Utility Companies Sold in the Open Market during the year 1923. List Includes Only Issues of $5,000,000 and Over," that list contains the identical bonds that I have, only without groupings, and includes bonds whose yields on offering price were in some cases as low as 5½ per cent, and in other cases as high as 7 per cent.

What I did was to take the same bonds and reclassify those bonds according to the classification which Mr. Hoyt gave in connection with his testimony that "in connection [fol. 7520] with the various classes of securities, investors have come to think of bonds in a certain classification, bonds legal for savings bank-, and bonds not legal, they have also come to think of the classifications in the terms of which some of the established services have rated them, that is, A-1 bonds or triple A bonds; many investors have in mind those ratings in connection with the type of securities purchased." I applied Mr. Hoyt's tests, to subdivide all of the bonds that Mr. Crunden used in his exhibit, Plaintiff's Exhibit 16.

My exhibits show the yields according to the classifications as stated by Mr. Hoyt (Abst. 188) as follows: "Many investors have in mind those ratings in connection with the type of securities purchased." My exhibits show the cost to the company on the basis of those classifications, and show all of the information, wherever I have used classifications here, on the basis of the classifications as stated by Mr. Hoyt in his testimony.

Recross-examination.

By Mr. Blackman:

As to where my graphs show the information on the basis just stated, I refer to Exhibit X-236 where you find the yields shown according to each rating classification. X-227 does not attempt to classify the bonds according to ratings. That is the average for the industry. My other summary X-228, as I have already stated, deals only with the totals, and does not deal with the ratings. My other summary, sheet X-229 included only the general average of all of them. I did not understand the question, of Mr. Goldstein to refer to every exhibit as showing a classification on the basis of Mr. Hoyt's classification, but I understood it to be directed to the point as to whether the exhibits submitted by me were grouped according to that principle.

The fact is, the comparison that Mr. Goldstein referred to as having been stated by Mr. Hoyt is nowhere brought out in any of my summary exhibits. It is only on the underlying exhibit where it can be found.

In stating that I had merely followed the table that Mr. Crunden had put in in this case, I refer to the table that appears at pages 1276 and 1277 of the record of the previous trial. In that table there is no comparison of Bell Bonds [fol. 7521] with railroad bonds or any other bonds. They are all thrown together into one group there. That is, they are just a list here of a number of issues of bonds.

I didn't state that I had followed his group to the extent of a classification. I knew well that he did not classify them, and I attempted to carry it one step further. While I was familiar with what Mr. Crunden did in this case, I can't say that it determined the manner in which I proceeded to prepare the data.

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[fol. 7522] GEORGE B. MCCANN, a witness on behalf of defendants, having been previously duly sworn, resumed the stand for further cross-examination by Mr. Thompson, and testified as follows:

Cross-examination.

By Mr. Thompson:

June 21, 1932.

On Exhibit X-312 there are listed nine delays in furnishing information requested. They are all that are introduced.

In the sense that I have used it here, it is a delay if there is a lapse of time between the request and the granting of it.

I think it is quite obvious that our work was interfered with by these delays listed in X-312. If I am asked to do a certain thing and I have to wait ten or twelve days before I can start out, I am naturally that much behind. I do not know to what extent that might have been construed as "substantially" interfering with the work which we were doing with the Western Electric, but I do think they constitute some interference.

Mr. Hagberg, who was associated with me in doing this work, is now on his vacation.

I am familiar in a general way with the work involved in the preparation of Exhibit X-35, which shows the shop variations to basic gross profits, plus and minus, and the other adjustments of the Western Electric Company.

I do not know it to be a fact that all of the underlying data from which that exhibit could have been prepared had been delivered to Touche, Niven by the Western Electric Company, because I personally did not work on it.

"Q. Now, if there is any dispute about that, I want Mr. Hagberg back, and I will put this other question. I will ask you if it is not a fact that at the request of Touche, Niven, and Mr. Goldstein, five men, employes of the Western Electric Company, who were here for the purpose of assisting the plaintiff in the presentation of its case, spent an aggregate of thirty days' time in assisting Mr. Hagberg in the preparation of his Exhibit X-35. Now, if he says he does not know, if there is any dispute about it, I want Mr. Hagberg back.

[fol. 7523] Mr. Goldstein: When Mr. Hagberg started to work on these questions of the shop variations, we got all the assistance that we asked for from the employes of the Western Electric Company, whether there were five men or two men or ten men or fifteen men, I do not know. But he stated from the witness stand that we got all the co-operation.

Mr. Thompson: We took five men, who were out here, to help do the work, and they spent an aggregate of thirty days' time helping you.

Mr. Goldstein: The record will show that those five men were sitting in the courtroom, and I asked Mr. Gregory whether they were all in the courtroom to assist in this case and he said yes, and those are the five men that Mr. Thompson turned over to us, I suppose. And if you want all the facts, it was from July until January 1st, that we kept on requesting until we got it.

Mr. Thompson: All right."

I was engaged in work in New York in the office of the Western Electric Company, in an office furnished for us, continuously between February 12th and February 25, 1932.

At the time I commenced this work, the Western Electric Company was on a five-day week, so that its employes were not working on Saturday. What happened was, that these records that we wanted were brought down to the room that we were given the use of, and there was a custodian, and we were permitted to use the records in that room.

I believe it is correct that between February 12th and February 25th at our request, the Western Electric Company kept its office open on two Saturdays, one holiday and six nights in order to facilitate our work in the examination of these records. When I first went to the Western Electric Company in connection with these records, I knew that others were requesting and obtaining that information for the City of Chicago and the Illinois Commerce Commission, the defendants in this case. I did not know there were four sources altogether. I knew that there was pending in other jurisdictions, either confiscation or rate cases, in which the same question as to the Western Electric prices and their reasonableness was involved.

It is possible that I knew that when requests were being made by four different people of the Western Electric Company, that there was always a chance that there would

[fol. 7524] be a duplication of requests. I do not know what the fact is. I know that there were certain duplications that came to my attention. I do not know it to be a fact that the Western furnished information in this case, and the receipt of it was forgotten, and then weeks afterwards another request was made to furnish the identical information. I do not think it involves anything that I asked for. I cannot answer for the other parties, I do not know. I knew, in addition to that, that the Western had its own rather large business to attend to.

In Exhibit X-312, referring to No. 9, which was the information I said was requested at noon one day and furnished at 10:15 the next morning, I wrote the following:

"The letter of February 12, 1932 requested certain information stated in that letter, and the notations at the bottom of the letter show the routine to get an answer to a simple request."

I do think there was a lot of endless red tape in getting this.

The request of February 15th, analysis of average investment in operation, Bell and non-Bell business, seems to be the same request. A receipt from the Western Electric Company, which counsel for defendants has furnished shows that my request was received not at noon, but at 4:12 p. m. of the 15th day of February, and was supplied to us at 10:12 a. m. on the next morning. Those dates refer to the time that Mr. Coles received the request. He did not receive the request directly from me.

I think that the notations on that particular request outline the procedure that was followed. The request was not in writing at the time we originally made it.

Referring to item 1 as it appears on Exhibit X-312, under date of December 29, 1931, we requested analysis of 1925 cost of sales and supporting details. In a letter that was written by Touche, Niven & Co. signed by Mr. Whitworth, this paragraph appears:

"In regard to the analysis of cost of sales for the years 1925 and 1930, all of which we have already been provided with a photostatic copy by Mr. Benjamin Goldstein, we should like to have the opportunity of examining the breakdown or makeup of this statement when it is convenient for your officials to give it to our men."

[fol. 7525] On the same day that this letter was delivered, Mr. Gregory's men delivered to us the 1930 analysis of cost of sales.

"Q. On the same day Mr. Gregory called Mr. Whitworth personally on the telephone and told him that the work-sheets and underlying data for the constructive analysis of the cost of sales of 1925 were available for your inspection at any time, called him on the telephone and told him that, didn't he?

A. I am not familiar with what conservation he may have held with him.

Q. And also told him that he, Mr. Gregory, wanted to use the underlying data of 1925 for two or three days, and that he assumed that Mr. Whitworth could go ahead with the underlying data for 1930, and that when he finished with the underlying data for 1930, Mr. Gregory would gladly supply him the other.

Now, I am going to show you a letter dated December 30, 1931, from Mr. Gregory to Mr. Whitworth. You read the first paragraph of that letter and tell me if what I said is not true.

A. Yes.

Q. Yes, sir. That is the No. 1, that you are complaining of.

Now, let us see, first we gave you on the date you asked for it the 1930 analysis; secondly, on the same day Mr. Gregory telephoned to Mr. Whitworth, saying that all of this was available at any time, but that he, Mr. Gregory, wanted to use the 1925 analysis for two or three days, that is right, isn't it.

A. That is the statement in the letter.

Q. And the following day he confirmed it by letter. Now, that is not all that happened, is it? You know that on the 30th day of December, the day following this request, at your application, Mr. Gregory sent Mr. Meason, one of the employes of the accounting department of the Western Electric Company, he sent Mr. Meason to your room, where he worked with you a substantial portion of that day, a substantial portion on December 31st, and a substantial portion on January 4th, explaining to you the method by which this analysis of cost of sales had been put up.

A. He worked with me.

Q. Yes, sir.

[fol. 7526] A. I am not certain of the amount of time he spent with me.''

In addition to that, January 1st was a holiday. That came on Friday. Saturday, January 2nd was a non-working day with the Western. Sunday was the 3d of January. I got this folder, this second folder of which we are complaining, on the 8th of January. We had this second folder available for our inspection for twenty-six days after it was delivered to us, and the other folder for twenty-six days, plus the interval elapsing between December 29th, and January 8th.

''Q. Now, I have got these two folders in the court room. What was your purpose in wanting to inspect these folders?

A. Mr. Goldstein was supplied with two photostatic copies of analysis of cost of sales for the year 1925 and the year 1930, and we made an examination of this underlying data to see what data the company had underlying the preparation of these two photostats.''

Our purpose was to find out the method that the company had used, a general scrutiny of the records to see what was there. Particularly we wanted to know the method. We had instructions to that effect.

These had been specially prepared by Mr. Gregory. In other words he had been requested in Michigan to build up a constructive analysis of cost of sales for the year 1930, and he had been requested, in Ohio to build up a constructive analysis of cost of rates for 1925.

I believe it is correct that those were not papers that Mr. Gregory had prepared his exhibits from, that had been introduced in Ohio.

The most of what we were after in this case was to ascertain the method, and to take whatever fact we could get from the papers.

''Q. I want to know whether you took a single fact off those records in those two constructive analyses of cost of sales?

A. I may or may not. Many——

Q. You may or may not. You are complaining of it. I want to know whether you did or did not. Not what the possibility is. What is the fact.

A. I cannot answer that; I do not know.

Q. Isn't it a fact that after all these statements, you still [fol. 7527] want to stand—you still want to maintain before this court that you were inconvenienced in the slightest by any delay that you now claim with respect to item No. 1?

A. If you had furnished the 1925 cost of sales, we would have used it generally with the 1930 cost of sales."

There was no particular reason for not bringing in Mr. Gregory's letter of December 30th, which had that explanation in it. It was not purposely left out.

I do not see that that makes the slightest bit of difference on the question of delays, that Mr. Gregory had telephoned to Mr. Whitworth and told him that the company wanted to use this for a few days and then it would be furnished to him.

If you put it that way, my position is, when I want anything, I want it, and without respect to the convenience of the company that it is used in other matters, my position is that it was to be delivered to us immediately.

"Q. All right. I am glad to get your viewpoint.

Mr. Haight: Of course, our view is, in view of the long delays that we participated in, that immediately was not soon enough.

Mr. Goldstein: Particularly in view of our promise to start on February 15th in this case.

Mr. Thompson: We will discuss that when we meet it.

Q. Now, I want to take it up No. 7 on this list.

The Court: In other words, they should have furnished it sooner than immediately?

Mr. Goldstein: From July to December we could not get anything, and we were after something.

I do not know when Mr. Goldstein got these photostatic copies.

Mr. Thompson: I will ask you if it is not a fact that the photostatic copies which you are talking about that you had were in the possession of Mr. Goldstein from October 6th, 1931 until the date when you made this request, and they were forwarded to you October 6th, and they were forwarded to you; October 6th, November, December, two and one-half months?

A. I do not know when Mr. Goldstein received them."

It may or may not be true that item No. 7, under date of April 8, 1932, a request for adjustments made to net profits

to obtain net income in federal income tax returns, was not [fol. 7528] a request for inspection but one that the Western Electric Company compile the information for us.

(Counsel reads from letter of request dated April 8, 1931 as follows:)

"In connection with our examination relative to the Chicago rate case, will you kindly furnish us with the following information:

"'1. Total federal income taxes paid by the Western Electric Company, Inc., and subsidiaries, applicable to each year of the period 1916 to 1931, and showing also by years how the total tax has been apportioned among the separate companies;

"2. Federal income tax charged to profits, by years, by the subsidiary companies of the Western Electric Company, Inc.' "

That is the request we made. As to whether it calls for any work on their part, I do not know. There are a lot of things that a corporation prepares itself that it could just turn over to me. I understood it did require work. At least, I was told it required work.

"Q. Yes. That request was delivered to the Western Electric Company on Friday, and on Monday morning, April 11th, you were advised definitely that the preparation of the material which you had requested involved considerable work?

A. I was advised that it required work. I do not know how much work."

I do not recall what I was told at the time. As a matter of fact, the thing that we requested involved not only the Western Electric Company, but when it was furnished to us, it also involved the Manufacturers Junction Railway, the Hudson Street Corporation, the Electrical Research Products and its foreign subsidiaries, the Electrical Discount Corporation and the Graybar.

In so far as those corporations had been in existence, the information was furnished us for the entire period 1916 to 1930 or 1931. When we got that, we weren't done then, there were a couple of questions. I believe it is correct that this statement was delivered on the 19th, and on April 22nd, the

Western Electric Company furnished us additional information on this subject matter in response to our oral request. [fol. 7529] An additional statement was furnished to us in answer to further oral questions which had been raised by us. Finally, on April 28th, Mr. John Burgess explained certain data on this subject to our Mr. Loutit, a man who was working under my supervision and direction, and assisting us on this job. Under those circumstances I still claim that there was a delay with respect to that. We have a claimed delay with respect to the Consolidated balance sheet. That request was made by us on January 27, 1931, and the data was furnished to me on February 11th. I do not know if it was furnished to Mr. Goldstein also. I do not recall whether Mr. Goldstein was there when it was furnished.

I assume that by letter of December 19, 1931, Mr. Bracelen wrote to Mr. Goldstein in part as follows:

"I am enclosing you herewith the following exhibits, which we propose to offer in connection with the testimony of Mr. R. H. Gregory, comptroller of the Western Electric Company;

"Consolidated earnings of the Western and its subsidiaries for the years 1916 to 1931, inclusive. This is a new exhibit."

It was the date back of this exhibit about which I am now claiming a delay. The next to the last paragraph in this letter is as follows:

"We are having the figures for 1931 appearing on Exhibits 1, 2 and 5, and all the figures appearing on 3 and 6 carefully audited and checked."

The letter also says:

"I do not believe there will be any major changes, but as soon as this work of auditing and checking is completed, I will advise you definitely as to the result.".

I did not know of that letter when I made this request.

A letter of February 11th from Mr. Bracelen to Mr. Goldstein, the same date that I made my request is as follows:

"Dear Sir: On December 19, 1931, I cent you six exhibits which we propose to offer in evidence in connection with the testimony of R. H. Gregory, comptroller of the Western Electric Company. I advised you at that time that we were

having the figures for 1931, appearing on numbers 1, 2 and 5, and all the figures appearing on No. 3 and 6 carefully audited and checked, and that as soon as the work was completed I would advise you definitely as to the results. This [fol. 7530] work has just been completed, and no changes are indicated as a result of such work, except with respect to No. 3, which is the consolidated earnings statement of the Western Electric Company and its subsidiaries for the years 1916 to 1931, inclusive. I am enclosing a new exhibit for such consolidated earnings, which gives effect to the revision."

I did not know about that letter. The result was, that I made a request of the Western Electric Company on the 27th of January.

It seems to be correct that counsel for the City of Chicago knew if the Western told the truth about this matter, that the underlying data which I was applying for at this time was being examined and checked and audited, and that as soon as that was finished, plaintiff's counsel would advise whether the figures appearing on a statement that had been submitted in December were correct or otherwise. It also appears to be correct that he also knew that if the Western told the truth, the work in doing that had been finished on the 11th day of February, the same day that I got this underlying data.

"Q. If that is true, do you withdraw your claim of delay?

A. I do not see how that affects me. I think that is up to counsel to decide whether to withdraw it or not.

Q. I see. I want to get this definite because I think it is important. If you made a request which you put in your exhibit and claim that delay resulted from it, and that you were impeded in your work, and you found out before your request was made, that a statement affecting the subject matter was delivered to counsel for the City of Chicago pursuant to whose directions you were working, and counsel was advised that auditors were engaged in checking the accuracy of those statements and using the underlying data, and if that was perfectly true, and if the minute that that was finished, these books were turned over to you for your inspection, you would still claim delay.

A. Well I think that is an argument for counsel."

If I knew that the Western Electric Company, because of this litigation, had employed a firm of outside accountants to audit this consolidated balance sheet, and that they were engaged in working on it, and that our counsel had [fol. 7531] been advised of that fact before I made this request, I think my statement stands as it is. I still insist I think it is a matter of argument between counsel. I do not want to become a party to the controversy. My viewpoint about it is that I would have liked to have received the information sooner than I did. I could have made use of it. I still say that, under those circumstances, I claim a delay for which in my opinion the Western is responsible.

Referring to numbers 4 and 6 on my statement, relating to two requests in which we desired the Western to make an analysis for us of principal items appearing on the Products Company No. 1 report for the year 1930, net operations, and in a later request, for the years 1927, 1928 and 1929, I don't know whether they had to get it up or not.

"Q. Well, they told you that they had to get it up, didn't they?

A. I think that is beside the point."

The company has a lot of statements—I am not in a position to know whether they have those statements prepared in the normal course of their business or not. They eventually gave the information to me.

What we asked for was "Analysis of principal items appearing on Products Company No. 1 reports." We had the report, but it meant very little to me. I wanted a breakdown on it.

Before the time I made this request, I had been advised that I could have the right to inspect all the books of the Electrical Research Products.

There were many reasons why I could not have done this job myself. To do the work myself would involve an audit of the Electrical Research Products. I was not making any audit of the Electrical Research Products.

"Q. What you wanted—and it is true time after time, isn't it, Mr. McCann—what you wanted was that the Western should do your work.

A. Not necessarily."

Exhibit A-235 is the information which was furnished

to us in response to requests 4 and 6. I knew, or was advised by the Western Electric Company, before these papers were prepared, that the information was not available in the form in which I requested it, without work, and that it would take a substantial time to prepare this statement.

[fol. 7532] In connection with the request No. 31, the request for the basis for the price paid for Teletype Corporation, was made by me February 3rd. When I made that request I did not know that Mr. Gregory had testified in Ohio, in the Ohio record, as to the basis of the price paid for Teletype Corporation. I knew Mr. Goldstein had the Ohio testimony, but I did not know what it covered, and I did not know when it was furnished. There was a misunderstanding between Mr. Gregory and my firm about the letter of April 3rd, with respect to Item No. 8. There was a conversation between Mr. Gregory and myself in which I said that I would rephrase the questions that were stated in my letter of February 3rd. I do not know that I told him he could disregard the letter. I repeated almost verbatim every request contained in the letter of February 3rd, in the letter of February 8th, and then added three additional requests.

I do not recall when I had the conversation with Mr. Gregory and I cannot say whether he could have easily understood from that conversation that these requests were not to have been answered until he got my additional letter. My impression is I did not receive any response to the letter of the 3rd, and that was the reason for the letter of the 8th.

There was some further misunderstanding about item 8, I think I had tried to explain it to him. There seems to have been a misunderstanding about it.

As to No. 5, pertaining to a request for plant depreciation rates, Exhibit X-312, states "Number of the employes of the Western Electric." My letter of February 11th, making this request, is as follows:

"Data relative to the number of employes of the Western Electric Company, years 1916 to 1930, in so far as available, the number of new employes and releases or retirements in each year and the number in service at the end of each year."

I believe I was told it would take time to prepare this information about the separation of the Western Elec-

tric employes and the number of employes in service at the end of the year.

(Exhibit A-236 was marked for identification.)

Exhibit A-236 is the sheet that was prepared and delivered to me.

[fol. 7533] I believe the Western Electric Co. furnished it to me when they finished it.

R. C. RAINWATER, a witness on behalf of defendants, having been previously duly sworn, resumed the stand for further cross-examination by Mr. Thompson, and testified as follows:

Cross-examination.

By Mr. Thompson:

June 23, 1932.

The only exhibits which have been identified during my direct examination that relate to the Western Electric Company are Exhibits X-293, X-294 and X-295 and Exhibits X-296 and X-297 and X-298 carry some percentages showing the return on investment from the capital stock of the Western Electric Company. They are based particularly on X-294. X-294 is more than a list of the investments of the American Telephone & Telegraph Company in the capital stock of the Western Electric Company from November 17, 1915, to December 15, 1930. It shows figures in X-293 computed on an average yearly investment and the dividends received are related to this yearly average investment.

I do not know whether X-294, the column showing yearly investment, represents the original dollars of investment of the A. T. & T. in Western Electric Company. I know only that I have taken the figures which were furnished to me designated as X-293 and made a computation of the average investment yearly and related that to the dividends. I have no knowledge as to whether these amounts actually represent the original investment. The figures in the column headed "Average Yearly Investment" are the ones shown on X-293. In X-294 I am figuring a return on the dollars originally invested in the Western Electric Company by the American Telephone & Telegraph Company as shown in Exhibit X-293.

If I started in 1916 with $100 invested in the Western Electric Company, and that was represented by one share of common stock; from 1916 until 1930 the company earned money which it did not distribute, and $900 of that money was applicable to my one share of stock, and, in 1930 the [fol. 7534] company earned $100 applicable to my share of stock, my exhibit X-294 would show the rate of return on my share of stock at 100 per cent.

On Exhibit X-294 I have included, in the year 1927, under the column, "Dividends received," a dividend in excess of $45,000,000 paid by the Western Electric Company to its stockholders. These exhibits (X-294 and X-295) attempt to show the earnings of the Western Electric Company in its total business, not in its Bell business alone.

After I have arrived at the yearly dividend to the company on X-294, I then convert that, by the method which I explained to Mr. Blackman in the last column, so as to show a larger return to the stockholders than to the company. So that, for instance, in the year 1927, when the $45,000,000 dividend is included, the return to the company, as I figure, is 101.91 per cent, and to the stockholders 161.16 per cent.

The Western Electric Company of Illinois sold its total assets to a reorganized corporation, the Western Electric Company of New York, at the end of 1915. Before that sale, the Western Electric Company of Illinois had a capitalization of $15,000,000 of common stock of the par value of $100 per share. When the New York corporation was organized, it issued $15,000,000, 6 per cent preferred stock, callable at $120. It also issued 150,000 shares of no par common stock.

Assuming that the book value of a share of stock of the Illinois Corporation was $300, what the shareholder had on the date that this transfer was made, was one share of stock that was worth around $300.

When the preferred stock was redeemed I have treated the $15,000,000 of redemption as a cash dividend.

I do not know the details of the organization of the New York corporation. I was asked by counsel to prepare this Exhibit X-295 on two bases. One, to treat the $21,000,000 as an amount of dollars received, included with the dividends, and the other basis, to treat it as an exchange of stock. That is all I have done with it.

The only facts on which I included "Basis I" were these: I was directed by counsel to show it in this way. I knew that in November, 1915, that there was one share of [fol. 7535] common in the old company exchanged for one share of common and one share of preferred in the new. Some of the preferred stock is referred to in my exhibits as bonus stock. It is not all bonus stock.

When the Illinois corporation sold its assets in November or December, 1915, to the New York corporation, it had $15,000,000 worth of common stock of par value of $100 per share; when the New York corporation was organized, it was organized with a preferred stock issue of $15,000,000, 6 per cent stock, callable at $120, if called before its due date, and 150,000 shares of no par common stock.

If I owned a share in the Illinois corporation, we will say, that had a book value of approximately $300 a share, I got one share of preferred and one share of no par common in the new corporation. Of course, my new common stock was worth less than my old common stock, because it had a preference stock ahead of it. When they redeemed that preferred stock, on one of these bases, I have treated that as a cash dividend. My explanation as to what I was trying to show is that I was asked to show the return on the original capital of Western Electric Company. I am experienced in rate matters.

As to what I expected the court to do with it when I got it up, I really did not give very much thought to the purpose of what it would show. I was merely asked to prepare the computations, and I did it, and that is all. I felt my responsibility in that ended there. If I subjected the Western Electric Company to the same rule that I apply to public utilities, the test would be, what is the reasonable return on the value of its property in a given year.

Referring to page 4 of Exhibit X-295, by following my method (Basis I) on the redemption of this preferred stock, I get a return of 296 per cent in the year 1920. Without converting it for the yield per share outstanding, I get 328 per cent. That is all on account of this redemption. Likewise on page 3, in the year 1920, the per cent of dividends paid becomes 67 per cent on account of this transaction. On page 15 of Exhibit X-295 in the year 1927, the year when the special dividend was paid by the West-

ern Electric Company I get 469.15 per cent, as shown in column 13.

[fol. 7536] Page 10 of Exhibit X-295 refers to common stock issued December 2, 1929, which stock was issued for cash. It was issued on December 2d, and there was a dividend declared of $2 a share, $1 being a quarterly dividend and the other was a special dividend, and because the stock was issued in December, I have figured the annual dividend at 60 per cent, based on a period held, of one month. The same is true of page 11 of this exhibit, except that the figures are different, being based on period held.

I do several things on pages 12, 13, 17 and 18 of Exhibit X-295. First, I classify the issues of stock by years or by periods of time, when it was issued. The classification is shown in the preceding pages, the same items. I find returns on an original issue of 70 per cent; on the common stock of 1920 of 17 per cent; on the common stock issue of 1922 of 47 per cent; on an issue of 1928 of 2/10 of 1 per cent; and then I get down on the next page as low as minus 19 per cent. What I tried to show here is to make a computation as regards the individual issues, to show that the book values of the separate issues, that is, the net assets applied per share to each issue at December 31, 1930, are more or less than the capital at the beginning of the period, and then in connection with that I have taken the dividends received during the period. In other words, I tried to show here as to whether the dividends during this period came from earnings during the period or whether they came from surplus of the prior period. That is what I tried to show here.

In Class 1, "Original issue of stock prior to 1916," page 12 of Exhibit X-295, the average investment that I have there, of $5,995,000, is the original investment in the stock of the old Western Electric Company of Illinois, most of it put in, back in 1881, 1882 and 1883 and the other early years.

The book value of this stock on January 1, 1916, was $40,000,000. The process that I followed is briefly this: These people put their money into this corporation back in 1881 and 1882 and 1883 and 1884, and the other early years, a total of a little less than $6,000,000. By leaving the earnings in the business, when the New York corporation was formed, this stock had a book value of $40,000,000.

From 1916 on down to date, substantial portions of the earnings have been left in the business, so that the book cost [fol. 7537] is now $180,000,000. These earnings that I have got here are for the period 1916 to 1930.

It is not exactly correct to say that I have related earnings made in 1930 on a book investment of $180,000,000, to an original investment made in 1881 and 1882 of $6,000,000. The fact is that the $180,000,000 refers to all of the stock, and this is just the original issue of the stock; that is, the stock issued prior to 1916. Whatever earnings or whatever portion of the earnings is applicable to that stock, I figured it on the basis of its original cost, and not on the basis of any participation whatever in the undistributed earnings as left in the business. And then I take up each issue, and I find that the earnings range from 70 per cent, down to 19 per cent minus.

I have sheets that are identical, so far as the set-up by classes are concerned, but on page 12 I have a return of 70.96 on this original issue, and on page 17 I have 107.65 per cent. The difference is due entirely to the difference in the treatment of the basis 1 and basis 2. In basis 1 I have included the $21,000,000 as a cash dividend, and in basis 2 I have treated it as an exchange of stock, and in basis 2 I have a much larger number of shares of common stock at the end of the period, because of various split-ups. On one theory, I get 70 per cent and another theory 100 per cent, because in one of the exhibits I am treating this redemption of preferred stock as a cash dividend.

On basis 2 I treat the redemption of this preferred stock in reality as an exchange of three shares of preferred for two of common. I know in a general way what happened.

On the 19th day of February, 1920, the Western Electric Company had outstanding $30,000,000 par value preferred stock, 6 per cent, callable at 120, which would mean $36,000,000 for the purpose of calling that stock. Practically all of that preferred stock was owned by the American Telephone & Telegraph Company.

It had a small minority interest in this common stock, so that on that day it offered for sale 200,000 shares of its common stock at $180 a share, under the law it was offered to every stockholder, that is the minority interest had the same right to participate in that as the American Telephone & Telegraph Company.

The A. T. & T. acquired its entire proportionate interest [fol. 7538] in the common stock that was offered to it on the same day. The net result of that was that when it was all through, the Western Electric Company in substance had exchanged its outstanding preferred stock for new common stock. It was a reissue, and a rearrangement of its capital structure. In connection with that transaction, on one basis I treated this as a cash dividend to the amount of $21,000,000 in these exhibits. I was asked to prepare it on both bases.

Redirect examination.

By Mr. Goldstein:

On page 19 of Exhibit X-295, entitled "Earnings available for Common Stock related to Capital Stock and Surplus, based on Averages per Year," I show the earnings of the Western Electric Company related to the capital stock and surplus. That is all the earnings of the Western Electric Company as shown in the annual report. The other sheets on Exhibit X-295 deal only with the portion of the earnings which represents cash taken out from the Western Electric Company related to the cash put in.

Exhibit X-293, which is entitled "Investment in Capital Stock of Western Electric Company, Inc., from November 17, 1915, to December 31, 1930," is a copy of what counsel for defendants furnished me.

Except for what was given me, I have no knowledge of the correctness of the figures shown on the first line, November 17, 1915, number of shares, 146,050 common, price per share $46.08, cost $6,729,710, and so forth, and also on the second line which appears on that sheet.

"Mr. Thompson: That is all. The plaintiff objects to the introduction in evidence of Exhibits X-51 and X-52 for each of the following reasons.

The Court: Well, what is that?

Mr. Thompson: My objection will give your Honor what is shown in this exhibit.

It is admitted by Mr. McCann, who testified with respect to these exhibits, that he has deducted from average investment of the Western Electric Company, notes payable by the Western Electric Company to the trustee of its pension fund to the American Telephone & Telegraph Company and

others, aggregating many millions of dollars. It is like-
[fol. 7539] wise admitted that he has deducted from average investment in these two exhibits, claimed excess cash as testified to by him.

It is also admitted by Mr. McCann that he has not decreased the profits on account of interest paid by the Western Electric Company with respect to its notes payable, so excluded by him in average investment, or with respect to such claimed excess cash items.

Notwithstanding these facts, there appear on these exhibits for each of the years 1916 to 1930, the column headed, "Per cent return on Average Investment as adjusted (before depreciation)."

The exhibits are, therefore, not only of no aid to the court in the solution of any issue involved in this case, but do not represent the facts and are misleading.

To make the same objection to Exhibits X-84 and X-85, except that the excess cash item referred to in the preceding objection does not apply.

The plaintiff also objects to the introduction in evidence of Exhibit X-79; that is the exhibit that relates to the 309.4 per cent earnings of the Electrical Research Products, because it has been demonstrated to proceed on a fundamentally unsound and incorrect theory, and the results shown are contrary to facts.

Mr. Goldstein: Now, counsel evidently misunderstands X-51 and X-52. X-51 and X-52 are merely the exhibits which are a series of exhibits which we have used to lead up to the final conclusion, and these exhibits were prepared in view of the suggestion of his Honor as to what is the effect of a different kind of adjustment. And X-51 shows the adjustment—shows the effect on Mr. Gregory's exhibit, on the rate base adjustments. And then we have the exhibits which show the effect of the profits, and then we tie the two together and we give his Honor the final exhibits which we said should be the exhibits to use. And these exhibits are merely to contain the effect of the particular adjustments, and as stated in X-51, very clearly, they take the net profits per Mr. Gregory's exhibits and adjust the rate base, and show the effect of the adjustments on the rate base related to those profits. We have the other set of exhibits which relate—which take the rate base as Mr. Gregory used it, and show the effect of the profits.

Now, that is what these exhibits are intended for, and we [fol. 7540] so stated at the time.

Now, the same comment will cover X-84 and X-85.

As to X-79, we take issue with counsel that X-79 was prepared on the wrong basis. Just so that counsel will understand something that he has not stated, that the necessary consequences of counsel's conclusion that you must include the loans of the Western Electric Company as part of the rate base, would necessarily involve the conclusion that the Western Electric Company earnings would not show the earnings merely on the basis of loans, but would show the full earnings on the basis of investment.

Now, that is a matter of legal argument. This exhibit was prepared on our theory of the case. It is there. If counsel has any other legal theory, he has his facts. We claim his exhibits are just as unsound on his theory as he claims that ours are on our theory. We both claim they are sound.

Now, your Honor, that is the contention of each of us.

Mr. Thompson: I have one more thing to say about Exhibits 51 and 52. I will not say anything about X-79.

Here is this extraordinary situation, your Honor: It is admitted by Mr. McCann that in these exhibits he has failed to reduce the earnings by about $16,000,000. Now, the result is, we have an exhibit in this case where he takes out from one side the investment, and fails to make a corresponding reduction in the earnings. He does not stop there. If he had stopped there, that would be another thing. And then he comes over here and attempts to put up, on a theory that no one can justify——

Mr. Goldstein: He can. We can.

Mr. Thompson: —a percentage return—a percentage average return as adjusted.

Mr. Goldstein: We can justify it.

The Court: I think I will do this about these exhibits. I will receive them in evidence, but the court will require that as to each of the exhibits to which objections have been made here today, that when the exhibit is printed into the record, the objection of counsel should be printed on the exhibit in some way so that the court will have before it the criticism which is revealed at the exhibit.

Mr. Thompson: That is fine.

The Court: I think they should go in, because from the

standpoint of the plaintiff itself, if half of what is said about [fol. 7541] this is true, and the court should agree with you in the end, it has a very serious bearing upon the weight which is to be given to all of the testimony of the witness who would do such a thing.

Mr. Goldstein: Yes.

The Court: So that I think the exhibits should go in with the objection revealed, the objection leveled at it in conspicuous form, so that the court will have just what this accountant has done and he will have the objection which is made to his work, so that they may have the benefit of the—so that the defendants may have the benefit of it in the end on the argument in the case, that he has proceeded on an entirely fair and rational basis, the defendants will have the benefit of that when it comes to consider his testimony. If it appears that he has brought an exhibit in here on an utterly foolish theory, that has a bearing upon the weight that is to be given to all of his testimony.

Mr. Haight: May not the defendants also have their theory accompany the exhibit as well as the objection?

The Court: I would say I am not making it as to all of the exhibits.

Mr. Haight: No.

The Court: Just as to the one exhibit.

Mr. Haight: I said only as to these specific exhibits.

The Court: Yes, I think that is fair. In connection with the exhibit, there should be printed what counsel has said in objecting to it, and what Mr. Goldstein said in defending it here this morning. I have no doubt that the attorneys who have charge of this work can agree upon the legend which is to be made on the exhibit.

Mr. Bracelen: Your Honor, I take it that the same instructions of the court will apply to all exhibits, as well as particular exhibits.

Mr. Thompson: Where objection is made.

The Court: Where specific objection is made. I have no quarrel with that way of handling it. It would be very convenient for the court to know if there is some particular point which is made against an exhibit, that it omits an essential element or something of that kind, to have it on the exhibit, or in the abstract immediately adjacent to the exhibit in such a way that the court will not have to go all through the record to find it; for instance, a criticism which

[fols. 7542-7625] is made upon a heading here, average adjustment.

Mr. Thompson: I think that is a good suggestion.

The Court: Now, the criticism is made that it is unwarranted by any evidence in the record. Now, those exhibits should be so printed and the abstract should be so prepared that it will be brought to the court in such a way that its attention will be challenged, and they will not treat the objection on any other basis than that which is claimed for it, and when we come to consider the exhibit, we will have the point that is made against it in mind, and the justification for it. You can work that out."

[fol. 7626] R. C. Rainwater, a witness on behalf of defendants, having been previously duly sworn, resumed the stand and testified further as follows:

Direct examination.

By Mr. Goldstein:

June 28, 1932.

Defendants' Exhibit X-328, consists of three pages. Page 1 is entitled "Illinois Bell Telephone Company, Chicago Division—Comparison of revenues and expenses and return on average fixed capital and material and supplies, less accrued depreciation, years 1923 to 1931, inclusive"; page 2 has the same heading, excepting the reference is to "Chicago Division, intrastate"; page 3 has the same heading except that it has reference to the "Chicago Division intrastate exchange." This exhibit was compiled from Plaintiff's Exhibits A-49 and A-53, as to all figures except the following:

The reserve for accrued depreciation, and the reserve for intangible capital were taken from the books of the company. There was excluded from the company's figures of miscellaneous revennes shown in A-49, Account 313, interest revenue, and Account 314, sinking and other reserve fund accretions. There was added to the company's figures of miscellaneous revenues the portion of Account 311, miscellaneous rent revenues, which were excluded from A-49. There was added to the company's figures of expenses shown in A-49 the amount for Account 320, rent expense, shown on the books of the company. The taxes were set

[fol. 7627] up on the basis of accruals shown by the books of the company. All changes in the revenues and expenses were made to agree with the accounting classification used in connection with the income showing of the various licensee companies.

X-328 shows for the Chicago Division, Chicago Division Intrastate and for the Chicago Division Intrastate Exchange, the revenues and expenses and returns on average fixed capital and materials and supplies, less accrued depreciation, on the same basis as that shown in Exhibits X-299 and X-300 for all licensees so as to serve as a basis of comparison between them and the plaintiff.

The separation of the figures of the Chicago Division into those of the Chicago Division Intrastate and Chicago Division Intrastate Exchange were the company's figures as to all items contained in A-49 and A-53. Those taken from the books of the company were apportioned on the basis of similar items shown in A-49. The depreciation reserve was apportioned on the basis of plant, using the average fixed capital shown in A-53.

Defendants' Exhibit X-329, consisting of four sheets, is entitled, "Illinois Bell Telephone Company—Entire Company—Return on average fixed capital and materials and supplies, less average accrued depreciation, in excess of the average return of other licensee companies of American Telephone & Telegraph Company during the years 1923 to 1930, inclusive," on page 1; on page 2, the same thing for the year 1931, and on page 3, the same thing excepting the return is on the basis of comparison with all licensee companies, and page 4 for the year 1931 on the basis of all. It was compiled from the following sources:

Page 1, line 1 comes from X-300;

Line 2 comes from X-300;

Line 3 is a computation;

Line 4 comes from X-302;

Line 5 is self-explanatory.

Line 6 shows that the net income available for return under the existing rates exceeded the average return of the other licensees by the amount in each of the years begining with the year 1923:

Line 7 shows the effect of the reduction in rates due to [fol. 7628] the attacked order; as shown by the plaintiff in Exhibits A-52 and A-63;

Line 8 shows the amount by which the net earnings available for return under the attacked rates on the plaintiff's showing would exceed or would fall short of the average returns of the other licensee companies;

Line 9 gives effect to the amount by which the Illinois Bell license payment exceeded that of the other licensee companies for each of the years beginning with the year 1923, as we computed the same in X-146 from the figures furnished us by Mr. Heiss prior to the trial;

Line 11 gives effect to the amount by which the company's depreciation expense as recorded on its books exceeded the Illinois Commerce Commission order as we computed the same in X-158;

Sub-section (b) of line 11 is an additional adjustment which we made in order to give effect to the difference in the depreciation reserve which would have resulted from the use of the Commission's allowance.

This amount is shown in old Exhibit X-521, which was sent to the company. It should be noted that no adjustment is made in this exhibit for the intrastate separation, as naturally it takes the whole company figures into account.

Page 2 covers the year 1931 and is similar to page 1, excepting only that it does not take into account any adjustment of the year 1931 for the license contract, as we have only worked out for that year the adjustment for the Chicago Division.

Page 3 is similar to page 1, excepting that the comparison is on the basis of all companies instead of other companies. The adjustment of the license contract payments by comparison of all companies, instead of others is shown in old Exhibit X-558, which was sent to the Company.

The adjustment shown as 11 (b) came from old Exhibit X-516, which was sent to the company.

Page 4 is on the basis of comparison of all licenses for the year 1931. No adjustment was made for the license contract discrimination for the year 1931 for the reason already stated.

The adjustments shown in line 11B came from old Exhibit X-517.

[fol. 7629] Wherever I say "old exhibit sent to the company," I mean the sheets which were sent to the company, but have not been furnished as exhibits, but have been used as working papers.

Defendants' Exhibit X-330, consisting of two pages, is entitled, "Illinois Bell Telephone Company, Chicago Division," "Return on Average Fixed Capital and Materials and Supplies, less average accrued depreciation, in excess of the average return of other licensee companies of American Telephone & Telegraph Company, during years 1923 to 1930, inclusive," on page 1, and page 2 the same thing excepting the comparison is for all companies. It is a computation prepared on the same basis as X-329, excepting that it refers to the Chicago Division. The sources for X-330, in addition to those used in X-329, are X-328 and X-147 and old Exhibits X-562, X-521 and X-520, which were work sheets sent to the company.

Defendants' Exhibit X-331, is entitled, "Illinois Bell Telephone Company, Chicago Division Intrastate—Return on average fixed capital and materials and supplies, less average accrued depreciation in excess of the average return of other licensee companies of American Telephone & Telegraph Company during years 1923 to 1930, inclusive," on page 1, and page 2, has the same heading except the words, "All licensee companies," appears instead of "Other licensee companies." It is computed on the same basis as X-330, excepting that it gives effect to the additional factor of adjustment due to the change in the method of separating the revenues and expenses between the Chicago Division Intrastate, Chicago Division Interstate, and Chicago Division Intrastate Exchange, as made by the defendants in Exhibits X-264 to X-270-B, rather than as made by the plaintiff.

Item 13-A, additional return of Chicago Division Intrastate, due to adjustment of depreciation expense was computed on the basis of the company's apportionment in A-49 of the depreciation and maintenance expenses.

Item 13-B was taken from old Exhibits X-523 and X-522.

Defendants' Exhibit X332 is entitled, "Illinois Bell Telephone Company, Chicago Division Intrastate Exchange, Return on average fixed capital and materials and supplies, less average accrued depreciation, in excess of the average return of other licensee companies of American Telephone [fol. 7630] & Telegraph Company, during the years 1923 to 1930, inclusive," on page 1, and page 2 is the same except the comparison is with "all companies" instead of "others." It is a computation compiled on the same basis

as X-331, and shows the basis of the comparison for the Chicago Division Intrastate Exchange only.

Defendants' Exhibit X-333 is entitled, "Illinois Bell Telephone Company, Chicago Division—Return on average fixed capital and materials and supplies, less average accrued depreciation, in excess of the average return of other licensee companies of A. T. & T. Company, after adding return due to adjustment of license payments on the basis of Plaintiff's Exhibit A-170, during the years 1923 to 1930, inclusive," on page 1, and on page 2, the same except that the word "all" is substituted for the word "other." It shows the final figures for the Chicago Division, Chicago Division Intrastate and Chicago Division Intrastate Exchange in X-330, X-331 and X-332 for 1923 to 1930, and makes the additional adjustment for the license contract payment to give effect to the showing of the Chicago Division under the license contract which has been computed from the figures shown in Heiss' Exhibit A-170 and underlying exhibits.

Item 2 of the first page is the difference between X-147 and X-151.

Item 2 of the second page is the difference between our computations as shown in the working papers sent to the plaintiff, old No. X-562 and old No. X-568.

Defendants' Exhibit X-334, entitled, "Illinois Bell Telephone Company, Chicago Division, Return on Average Fixed Capital and Materials and Supplies, less Average Accrued Depreciation in excess of the Average Return of other Licensee Companies of American Telephone & Telegraph Company during the year 1931," on page 1, and page 2 is the same except the word "all" is substituted for "others," for the year 1931 makes the same sort of a comparison as shown on X-333 for the previous years, and the adjustment shown as Item 11, Additional Return of Chicago Division due to adjustment of license payment on basis of other licensees, was taken from X-151 and the working papers sent to the company designated as old X-571.

Defendants' Exhibit X-335 is entitled, "Illinois Bell Tele- [fol. 7631] phone Company, Entire Company, Average Cost of Funds used in Business, eight years, 1923 to 1930." It is a computation showing, for the Illinois Bell, the average cost of funds used in business, and is prepared in similar manner to A-164. The figures were taken from the books of the company, the details of which appear in the old

exhibit numbers X-252 to X-259, which Mr. Blackman identified as A-219 and which I understand are to be offered by him.

Excepting in those exhibits where the comparison is made between the Illinois Bell and the other licensee companies, and excepting for the Exhibits X-273 and X-274, which were prepared to furnish the details as a basis for comparison with the other licensee companies, all of my exhibits which make use of the item of interest on loans paid by the Illinois Bell to the A. T. & T. use the figures of actual interest shown on the books of the company and as appear in Exhibit A-219, being the old Exhibits X-252 to X-259.

Defendants' Exhibit X-336, entitled "Ill. Bell Tel. Co.—Statement of Chicago Division, Chicago Division Intrastate and Chicago Division Intrastate Exchange, showing net income required to cover all interest, amortization of bond discount and expense, and an 8 per cent dividend together with resultant rates of return on the plaintiff's showing of average reproduction cost and average book cost, including materials and supplies and cash working capital during the years 1923 to 1930, inclusive," is a computation showing, for each year from 1923 to 1930, net income required to cover all interest, amortization of bond discount and expense and an 8 per cent dividend, together with resultant rates of return on plaintiff's showing of average reproduction cost and average book cost, including materials and supplies and cash working capital.

Line 1 was taken from Exhibit A-219 and is self-explanatory.

Line 2 shows the per cent of return on the plaintiff's showing of rate base on book cost, line 18, and on reproduction cost, line 11 of Exhibit A-53, which would be required to produce the amount of income shown in item 1.

Exhibit X-337, entitled "Ill. Bell Tel. Co.—Chicago Division—Statement showing the net earnings per share available for the stockholders of the Ill. Bell Tel. Co. and the [fol. 7632] average earnings available for A. T. & T. Co. stockholders on their proportionate investment in capital stock of A. T. & T. Co. which would result from varying rates of return on the plaintiff's showing of average book cost including materials and supplies and cash working capital, during years 1923-1930, incl.; same for average reproduction cost," applies varying rates of return to the

plaintiff's showing of rate base in A-53 on the basis of book cost, line 18, and on the basis of reproduction cost, line 11, and shows how much the net earnings available for return resulting from such percentages would be per share of capital stock of the Illinois Bell.

In the second column, for each year it shows the average net earnings per share on the A. T. & T. stock resulting from the net earnings per share on the Illinois Bell stock, on the basis of the A. T. & T. Company paying par for the stock of the Illinois Bell, and on the basis of the A. T. & T. procuring the funds for such purchase of stock from the sources and in the proportions shown by Mr. Heiss in A-164 and in my Exhibit X-108.

I used the A. T. & T. purchase of the Illinois Bell's stock purchased at par, because the Illinois Bell's history shows that the total premiums received by the Illinois Bell for the purchase of stock throughout its entire history was only $4,000.

Exhibit X-338 is entitled "Ill. Bell Tel. Co.—Chicago Division—Plaintiff's Exhibit A-53, adjusted for rate base of book cost of plant, less depreciation, etc., years 1923 to 1930," on page 1, and on page 2 for the year 1931, adjusts the plaintiff's showing in A-53 on the basis of book cost on line 18 by the following adjustments:

1. The average going value was computed on the basis of the percentage relationship of the going value set forth in the Illinois Commerce Commission's order of August 16, 1923, to the book cost at December 31, 1922, and similar percentages applied to book cost for each of the years 1923 to 1930.

2. Depreciation reserve is deducted. Depreciation reserve is computed to give effect to the Illinois Commerce Commission's allowance for depreciation.

3. Construction work in progress was deducted from the plaintiff's showing.

[fol. 7633] Exhibit X-339, entitled "Ill. Bell. Tel. Co.—Chicago Division—Plaintiff's Exhibit A-53, adjusted for rate base of reproduction cost of plant, less depreciation, 1923 to 1931," adjusts the plaintiff's showing on reproduction cost, line 11, to give effect to the following:

1. Deduction of construction work in progress.

2. Adjusts going value to the amount stated in X-338.

3. Deducts the entire amount of the depreciation reserve in full, as shown on the books of the company, but raised to represent the same percentage of the reproduction new of the property as shown in A-41 as the per cent of the depreciation reserve was to the book cost of the plant.

4. Computes the depreciation reserve on the basis of giving effect to the Illinois Commerce Commission's allowance for depreciation.

Exhibit X-340, consisting of four pages, entitled "Ill. Bell Tel. Co.—Chicago Division—Plaintiff's Exhibit A-53 adjusted for net income available for return under rates in suit and for rate base during years 1923 to 1931; same for Chicago Division Intrastate and for Chicago Division Intrastate Exchange, 1923-1930, incl.," adjusts the income in Plaintiff's Exhibit A-53 to give effect to the (1) adjustment of the license contract payments as we computed the same on the basis of the information furnished us by Mr. Heiss prior to the trial, as shown in X-147;

(2) The adjustment of depreciation expense due to the application of the Illinois Commerce Commission order, instead of the company's computation of the depreciation expense as shown in X-158; and

(3) To the defendants' separation of the Chicago Division Intrastate and Chicago Division Intrastate Exchange figures as shown in Exhibits X-264 to X-270B, and also give effect to the rate base as adjusted, as shown in X-338 and X-339.

For the year 1931 full effect is given to the adjustments on account of license payments arising from the computations made on the basis of A-170, as shown in X-151.

For the previous years, 1923 to 1930, as already stated, we have only included such adjustment for license contract payment as we computed from the figures furnished us by Mr. Heiss prior to the trial, as shown in X-147; but, as shown in Exhibit X-333, we have an additional adjustment [fol. 7634] resulting from our computation made from Mr. Heiss' figures on license contract which were offered as Exhibit A-170. That is, to clear this up for the years 1923 to 1930, my exhibits only show the adjustments based upon the documents which Mr. Heiss sent me prior to the trial, and in X-333 I have an additional adjustment, resulting from the additional documents which were furnished during the trial, in A-170. These are not reflected in Exhibit X-340, and I am now about to state what they are.

By giving effect to the additional adjustment for license payment, the percentages in line 9 of X-340, page 1, would be raised from the figures shown for each of the years 1923 to 1930, to the following:

The year 1923, 9.37; the year 1924, 8.67; the year 1925, 8.19; the year 1926, 7.98; the year 1927, 7.98; the year 1928, 8.17; the year 1929, 9.33; the year 1930, 8.27.

Similarly, in line 11 in X-340, the figures would be raised from the percentages shown on that line for each of the years 1923 to 1930, to the following:

1923, 6.35; 1924, 6.18; 1925, 6.06; 1926, 6.20; 1927, 6.48; 1928, 6.81; 1929, 7.87; 1930, 6.98.

In X-340, page 2, the figures would be increased as follows:

The year 1923, line 9, 9.27; the year 1923, line 11, 6.28; the year 1924, line 9, 8.49; the year 1924, line 11, 6.05; the year 1925, line 9, 8.03; the year 1925, line 11, 5.94; the year 1926, line 9, 7.75; the year 1926, line 11, 6.03; the year [fol. 7635] 1927, line 9, 7.74; the years 1927, line 11, 6.29; the year 1928, line 9, 8.01; the year 1928, line 11, 6.68; the year 1929, line 9, 9.05; the year 1929, line 11, 7.63; the year 1930, line 9, 7.91; the year 1930, line 11, 6.67.

Page 3 of X-340, the figures would be increased as follows:

For 1923, line 9, 9.45; line 11, 6.40; for 1924, line 9, 8.54; line 11, 6.08; for 1925, line 9, 7.98; line 11, 5.91; for 1926, line 9, 7.60; line 11, 5.91; for 1927, line 9, 7.61; line 11, 6.19; for 1928, line 9, 7.93; line 11, 6.61; for 1929, line 9, 9.20; line 11, 7.75; for 1930, line 9, 8.16; line 11, 6.88.

I have examined the following reports: MR-1, MR-22A, MR-22B, provisional estimate statement A for the year 1931, provisional estimate statement E for the years 1924 to 1930, the annual reports of directors of Illinois Bell to its stockholders, 1929 to 1931, annual reports of the A. T. & T. to its stockholders, 1920 to 1931, Bell Telephone securities manuals for the years 1923 to 1930, CR-51A for the years 1929 and 1931, CR-53, 1923 to 1930, CR-67, CR-67A, CR-76 and CR-97.

I found as follows:

MR-1, line 46, year 1929, shows "Balance net profit to average common stock."

MR-22A, year 1929, shows comparison of average of actual results with provisional estimates; line 26, "Balance net profit to average common stock";

MR-22B shows, sheet 1, the year 1929, line 26, "Balance net profit to average common stock (annual basis)."

Provisional Estimate A, year 1931, line 41, shows "Balance net profits (after preferred dividend) to average common stock";

Provisional Estimate E, years 1924 to 1930, shows "Balance net profits to average common stock";

Annual reports of directors of Illinois Bell Telephone Company to stockholders, year 1929, page 1; year 1930, [fol. 7636] page 1; year 1931, page 1, show net profits of company related to average capital stock outstanding for year.

Each of the annual reports of the A. T. & T. from 1922 to 1931 to its stockholders shows "Per cent of net earnings to average capital stock outstanding";

Each of Bell Telephone Securities manuals, years 1923 to 1930, shows "Ratio of net earnings to average capital stock outstanding";

CR-51A, line 46, the year 1929 and the year 1931, line 48, shows "Ratio of net earnings to average common stock outstanding";

CR-53 of years 1923 to 1930 shows "Per cent of net earnings on common stock of A. T. & T.";

CR-67 shows the same as MR-22A.

CR-67A shows the same as MR-22B.

CR-76 shows "Balance net profits to average common stock" for each of the associated companies separately.

CR-97 shows "Balance net profits to average common stock" for the entire Bell System.

I have examined MR-14, being a monthly report form entitled "Cash Report," being one of the reports of the Illinois Bell.

I found that the form shows the loans made by the A. T. & T. to the licensee companies, the amount of loans repaid by the licensee companies and the net amount of financing by A. T. & T. to the licensee companies during the month covered by the reports. It would be possible through the use of this form and the annual reports to the Interstate Commerce Commission to compute the monthly average loans to each of the licensee companies based on the balance, at the beginning and end of each month, and annual average could be computed on the basis of the monthly averages.

"Mr. Goldstein: MR-14, I might state, was made available to us, but we have never had a copy. We would like to have a copy of one of those forms, so that we may offer it, we would like to have it produced so we can offer it as our exhibit."

(Witness continues.)

Since Mr. Blackman's cross-examination, I have made computations to show what the effect would be in those exhibits, wherein I compared the Illinois Bell with the other [fol. 7637] licensee companies, by using the actual interest and loan figures, as shown from the books of the Illinois Bell and also using the loan and interest figures for all licensees, as shown by Mr. Heiss in X-103 instead of using the quarterly averages of City Exhibit 142. This is for all of the companies taken as a whole.

(Objection by Plaintiff; objection overruled.)

The figures from Exhibit X-133 for the Illinois Bell, using the actual loans and actual interest figures combined with the dividends and stock figures, would be, for the year 1923, for the Illinois Bell, 7.14 per cent instead of 7.15;

The year 1924, it would be 7.14 per cent instead of 7.13; for the year 1925, no change; for the year 1926, no change; for the year 1927, using the actual interest and actual loans, the figure would be 7.51 instead of 7.47; for the year 1928, the figure would be 7.54 instead of 7.56; for the year 1929, the figure would be 7.51 instead of 7.42; for the year 1930, the figure would be 7.67 instead of 7.66, and if you take the average of all the figures for all the years 1923 to 1930, the new figure would be 7.41 as compared with 7.39 based on the old figures.

Now, taking all licensee companies; the year 1923, unchanged;

The year 1924, unchanged; the year 1925, unchanged; the year 1926, 7.11 becomes 7.13; the year 1927, 7.19 becomes 7.20; the year 1928, 7.31 becomes 7.32; the year 1929, unchanged; the year 1930, unchanged.

Taking the years 1923 to 1930, the average, based on the figures as shown in X-133, would be 7.04, and substituting the actual interest and actual loans would be 7.05.

Taking the percentages as shown in Exhibit X-284, on line 11, of the Illinois Bell, and substituting the actual loans and actual interest, the per cent for the year 1923 would be

8.72 instead of 8.73; the year 1924, no change; the year 1925, [fol. 7638] 8.55 becomes 8.56; the year 1926, the figure 8.37 becomes 8.36; the year 1927, the figure 8.62 becomes 8.69; for the year 1928, the figure 8.96 becomes 8.94; the year 1929, the figure 9.32 becomes 9.46; for the year 1930, the figure 8.22 becomes 8.23.

And taking the average of the period, the old figures would be 8.70, and the new would be 8.73, and for all licensee companies, line 11, the per cents would be unchanged for the years 1923, 1924 and 1925.

For the year 1926, 7.76 becomes 7.78; the year 1927, 7.83 becomes 7.84; for the year 1928, it is unchanged; 1929, unchanged; the year 1930 is unchanged.

The average for the period of the old figures would be 7.52 and the new would be 7.53, and for all the licensees, exclusive of the Illinois Bell, line 11, year 1923, the figure 6.77 becomes 6.78; the year 1924, unchanged; 1925, unchanged; the year 1926, 7.71 becomes 7.73; the year 1927, unchanged; the year 1928, 8.07 becomes 8.08; the year 1929, 7.95 becomes 7.94; the year 1930, unchanged.

The average for the period on the basis of the figures as shown in X-284 is 7.43, and the new figure is also 7.43.

I made a computation from X-284 to show in dollars what the difference would be between the actual figures and the quarterly averages, comparing the Illinois Bell with the other licensees, both using the old figures, and then substituting the new figures. I took the total investment shown in line 10 of the Illinois Bell, and I applied to that the per cent shown in line 11 of the return on investment of the other licensee companies. That would be the return on the investment of the A. T. & T. in the Illinois Bell on the basis of the average return of the other licensee companies, and I got a certain amount, and I compared that with the return shown in line 5, showing the difference in dollars of these per cents as shown on line 11 for the Illinois Bell as compared with the per cents shown on line 11 of the other licensees, and I have made that computation on the basis of [fol. 7639] the figures as shown, and then I made the computation on the basis of the new figures.

My computation was made by comparing the Illinois Bell with all the rest of the companies.

In the year 1923, based on the old figures, it would be $1,448,494, and based on the new, $1,439,690, a difference of $8,804;

In the year 1924, the old figure was $1,978,756, while the new figure was $1,978,756, the same, no change;

The year 1925, the old figure, $1,407,105, and the new figure, $1,412,599, a difference of $5,494;

For the year 1926, the old figure would be $672,482, as compared with $649,795, the new figure, a difference of $22,687;

The year 1927, the old figure would be $1,020,767, as compared with the new figure of $1,075,174, a difference of $54,407;

The year 1928, the old figure would be $1,181,910, as compared with $1,149,405, the new figure, a difference of $32,505;

The year 1929, the old figure would be $2,125,024, as compared with the new of $2,279,812, a difference of $154,788;

The year 1930, the old figure would be $2,010,956, as compared with the new figure of $2,017,551, a difference of $6,595.

If you take the totals for the period, the old figure would be $11,845,494, and the new figure would be $12,002,782, a difference of $157,288. That would help the defendants to that extent.

Exhibit X-285, page 8, is headed: "Dividends and Interest on Stock and Loans paid by Illinois Bell Telephone Company to A. T. & T. in excess of the Average Interest and Dividends on Stock and Loans of other Licensee Companies."

Carrying through all of these changes that I have mentioned before, the figures on line 6 would be changed to this extent:

The figure $472,314 becomes $460,719; the year 1924 is unchanged; the year 1925, the figure $353,475 becomes $352,367; the year 1926, the figure $111,747 becomes $94,226; the year 1927, the figure $287,614 becomes $306,452; the year 1928, the figure $321,055 becomes $287,290; in the year 1929, the figure $291,650 becomes $390,938; and in the year 1930, [fol. 7640] the figure $864,576 becomes $873,299; or, taking the total for the period, the figures as shown of $3,039,390 become, under the new figures, $3,102,250, or a difference of $62,860.

Except for Exhibits X-137, X-142 and X-143, all of my license contract discrimination exhibits do not take into account the equalizing factor on return. My exhibits do not take into account any adjustments due to anything that might be revealed in the minutes of the Executive Committee.

(Defendants' Exhibits X-328 to X-340, inclusive, identified by Mr. Rainwater on direct examination, offered in evidence, subject to cross-examination.)

Cross-examination.

By Mr. Blackman:

The first exhibit that I dealt with today is X-328. I prepared it. I was asked to make a comparison of the showing of the Chicago division with the other licensee companies, and I prepared this statement showing what the return would be on the Chicago division. There is no comparison here. I have worked out here what the return is on the average fixed capital and materials and supplies less the accrued depreciation, just as the exhibit shows.

"Q. Well now is it your idea that this exhibit sets up anything showing any result on the basis of the value of the property used?

A. It is on the basis of original cost. It is on the basis of cost as shown on the books of the company."

This is the exhibit where I depreciated the original cost. I have taken here the fixed capital and materials and supplies. We left out the cash working capital. One reason I left out cash working capital was because in my showing here, I wanted to compare with the showing of the other licensee companies, and the showing for all of them would require some study as to what the requirements for cash working capital were, and I made the comparison strictly on the basis of fixed capital and materials and supplies, and in my revenue figures I left out such items as interest on bank balances that might come about through cash working capital. I have shown here what the return is on the fixed capital and materials and supplies. There is no comparison on this sheet. The comparison that I spoke of is on X-330. [fol. 7641] It is not entirely correct to say that what I really mean by this exhibit (X-328) is, that I am not presenting it as showing anything specific with regard to the return that the Illinois Bell is making, either on its value of the property or the cost of its property, but am setting up some figures here which I later use as a basis of comparison, of the same figures with other companies.

I have tried to work out here what the return was on the fixed capital and materials and supplies. The purpose of

it was to offer the basis of the comparison with the other licensee companies. As I understand the purpose of it, it is for the purpose of comparing certain operations of this company with operations of other companies. I did not have any purpose of my own. I was asked to prepare it on the basis of fixed capital and materials and supplies.

Page 1 of Exhibit X-328 includes interstate business. In determining my basis of comparison, I have deducted the reserve from the cost of the property as shown on the books.

At the bottom of the sheet it says: "This showing of return on investment is prepared on the same basis as the statement for all licensee companies, using the figures shown in Plaintiff's Exhibit A-49, except as indicated by notes (a) and (b) above." Plaintiff's Exhibit A-49 did not give me any of the figures on this sheet except the revenue and expense figures. That note should have read A-49 and A-53 instead of just A-49. I did not intend that note to be misleading. I refer there to these exceptions. Take taxes, for instance, I used the accruals instead of the payments. In other words, the company's Exhibit A-49 showed payments and I used accruals, and company's average fixed capital was taken from A-53. All I did was to just prepare the average fixed capital for the year based on the balances at the beginning and at the end of the year and the materials and supplies are taken from A-53. In these exhibits of the company's that I referred to, they did not proceed on any such basis as I have used here.

In the note on X-328, I say, "using the figures." I do not say it was the basis. Where I say, "This showing of return on investment is prepared on the same basis as the statements for all licensee companies, using the figures shown on Plaintiff's Exhibit A-49," the basis is not the same as [fol. 7642] the plaintiff's.

Referring to Exhibit X-329, in the year 1923 and subsequent years, I purport to make an adjustment which I call "Loss in recorded return, Illinois Bell Telephone Company, due to attacked rates." In the year 1923 I show that loss as $389,000, and in 1924 I show it as $1,566,000. The reason for that great difference is that the figure for the year 1923 was taken from Plaintiff's Exhibit A-52 to give effect to the date of the order, that is the effective date of the Illinois Commerce Commission order, October 1, 1923.

The difference was due to the fact that the amount shown for the year 1923 is the loss, giving effect to the date of the

Illinois Commerce Commission's order of October 1, 1923; while the figures in the year 1924 is for an entire year. So that the deduction that I make for the year 1923, is the loss that took place in one quarter. All of the other figures in that column for 1923 are on an annual basis, but I wanted to deduct here what the actual loss was for that period. I am purporting to show on this sheet what the result to this company would be under the Commission's rates, but giving effect to the date in the year 1923 that the order became effective.

As an accountant, I do not commonly make deductions of quarterly deficits from figures for the whole year, in order to get any intelligible result. But I was trying to show here what the actual experience of the year 1923 would be, with this adjustment only for that period in which the order was effective.

Item 11 down below was worked out on the same basis, of just the quarterly adjustment, due to the effective date of the order. What I was purporting to do here was to show the effect of the Commission's order upon the earnings of this company, based on that part of the year in which the order was effective. That is clear, what I have done.

I made it up because I was advised by counsel to show the effect, based on the effective date of the order, and that is what I tried to do. He instructed me to consider the effective date of the order, and I prepared the adjustments on that basis. My contribution is the mathematics only. All of the figures are on an annual basis except Items 7 and 11 [fol. 7643] for the year 1923. The figures in Line 9 are taken from X-147.

In X-147 I do not make comparison of a mixture of dividends and interest of other associate companies, with a mixture of dividends and interest paid by the Illinois Bell Telephone Company to the American Telephone & Telegraph Company, without discrimination between the amount that was interest and the amount that was dividends.

In Exhibit X-147, line 1, I say, "Return under present revenues from Illinois Bell Telephone Company, entire company, in excess of average return from other licensee companies."

The figure that I show there, which I call an excess is not the excess of the dividends and interest paid by the Illinois Bell Telephone Company to the American Telephone & Telegraph Company, as compared with dividends and interest

paid by other associate companies. There are no dividends in the figure at all. The figure is worked out from X-146. The figure is carried in from X-146 into X-147.

The purpose of X-329 to me was to make a comparison between the operating results of the Illinois Bell Telephone Company and those of other licensee companies. I do not know what purpose counsel might have had in it, but that was what I did. That was my purpose.

I cannot use a mass of figures without having some objective. In order to make that comparison and make it fairly, I made an adjustment in the depreciation account of the Illinois Bell Telephone Company. That adjustment amounts to as much as $4,429,000 for 1930. The net adjustment for the purpose of this statement is $3,000,000 for 1930. There is a corresponding amount of $1,500,000 I have to take off. That I have made up in the manner that was testified to by Mr. Tholin, giving effect to his interpretation of what the Commission determined in this case.

I did not make any corresponding adjustment for the other companies. I had no knowledge of any adjustments to be made in the accounts of the other companies. I made this adjustment that I knew about, as far as the Illinois Bell Telephone Company was concerned, and it was made just as shown. As to whether as an accountant I would take the accounts of these companies that are set up on the same gen- [fol. 7644] eral basis, and make an adjustment of over $3,000,000 in the accounts of one of them, without making any corresponding adjustment in those with which I make the comparison, I say that I have no knowledge as to what the proper figures for depreciation are for the other companies. I made the adjustment here on what the Illinois Commerce Commission had done with regard to depreciation of this company.

I did not know that the minute I had made that $3,000,000 adjustment, I absolutely destroyed the basis of comparison.

I took this large amount out for depreciation in one case, and did not even assume that there was some comparable amount to be taken out in the other, because all of this was prepared according to the request of counsel as to this particular adjustment. I was requested to take this adjustment into consideration, and I did so. It is a fact that in all of these exhibits that have been put in today, I have made them up especially, as directed by counsel. I do not know what

they mean. I do not know what the court should make out of them, after the court has read them.

(Counsel for plaintiff objects to this witness' exhibits, numbered X-328 to X-340. Objection overruled.)

Exhibit X-329 is also a comparison based on what I call cost, and not value. It also is based on figures built up through the deduction of the reserve. Those facts apply to each of the four sheets submitted, designated as X-329. Exhibit X-330 is built up on the same general principle as X-329.

The deduction of reserve, the deduction from the Illinois Bell of this amount which I say is an adjustment of depreciation,—all of these specific things that have been touched upon, apply to X-330 as well as X-329. Exhibit X-331 differs from the previous exhibits in that there are additional adjustments in there, due to the interstate separations, which were taken from the defendants' exhibits. I think that is shown here as Item 9. Item 9 is new. Item 10 is also new. There would be a new balance figure inserted there. With that exception, just two additional lines, all the other lines are the same as in Exhibit X-330. X-332 is the same, except [fol. 7645] that it is limited to the intrastate exchange.

Line 2 in Exhibit X-333 is the difference between the adjustment shown in X-147 and the adjustment in X-151, the license payments.

In Exhibit X-147, Item 4, Total Chicago Division, shows $407,960; and on Exhibit X-151 it shows $444,469. The difference between those figures is $36,509, and that is what is carried into this statement.

Exhibit X-334 is the same as X-330, X-331 and X-332, except that it covers the year 1931 solely, and sets up in parallel columns the result for the Chicago division, Chicago division interstate, and Chicago division intrastate.

In Exhibit 335, there is a typographical error. On page 2, in the first column, under amortization charges, the last figure on the page, at the bottom of the page is $94,492,231. That should be $9,449,231. It is not carried into my other computations.

Following the method which I have used in producing Exhibit X-336, the rate of return, applied as shown in Paragraph 2, would be reduced further and further as the value of the property increased, if there were no increase in capital stock or funded debt, or any other outside obligation in

connection with that property. That is, the fundamental principle on which I have proceeded here is that the greater the value of the property in connection with the other figures which I have used, the smaller will be the rate of return.

In Exhibit X-337 I make certain comparisons and I showed that a 4.91 per cent return to the Illinois Bell Telephone Company results in an 8.31 per cent return to the shareholders of that Company. That is due to the fact that the securities issued by the Illinois Bell Telephone Company against its property, were less than the cost of the property.

The 4.91 return to the Illinois Bell Telephone Company would have resulted, or might well have resulted, in less than the 4.91 per cent to the stockholders, if the securities were more than the cost of the property. If you increase the stock, why, you are going to get smaller earnings per share to the stockholders. I do not know any statement here as to what it is entitled to earn. I have not made any statement [fol. 7646] here as to what it is entitled to earn. I merely worked out what it would be if you provide interest and an 8 per cent dividend. That is all I have done. According to this method, if the stock is watered more and more, I would think it would make a poorer showing; it would make a poorer showing per share. That is, it would appear to the court that the company was needing more income, a higher percentage.

On Exhibit X-339 I go a step further with the reserve, and I not only deduct the reserve but I deduct a figure which is raised to the reproduction cost level. I testified near the end of my redirect examination by Mr. Goldstein concerning certain documents, CR and MR reports. I stated MR-1 shows on line 46 "Balance net profit to average common stock," and I made similar references to the form of the various reports as showing the profit to the average common stock, net profit to average common stock. I had no purpose in stating that those reports showed that comparison.

As to my purpose, I was asked to make an examination of these reports, and indicate what the reports showed, and I went through the reports and referred to this particular line on the report where it showed net profits to average common stock.

(Objection by defendants to question as to purpose of witness.)

I presume that that is something that practically every corporation shows. The basis of stating that comparison and the comparison that I made on Exhibits X-108, X-111 and X-115, which we went over here for two days is the same, as I understand it; that is, showing the return on the common stock. It is my understanding as an accountant that in making its annual reports in the customary form that companies use, showing the relationship between its earnings and its common stock, this company was doing something similar to what I did when I increased the rate of return from 34 per cent to 59 per cent to the stockholders of the American Telephone & Telegraph Company on Exhibit X-111, except that in my Exhibit Number 111, I took only a portion of the stock, that portion that would be represented by the telephone instruments, while in the reports of course, [fol. 7647] the entire common stock is considered. I think the showing is similar. As an accountant I think my procedure was similar to that followed by the company. I was only taking it on a part of the stock, and the company takes it on all of the stock. That is the only difference I know of.

I did not refer to any line in my testimony in connection with the annual reports of the American Telephone & Telegraph Company. I stated that each of the annual reports of the American Telephone & Telegraph Company to its stockholders, from 1922 to 1931, shows per cent of net earnings to average capital stock outstanding. On page 19 of the Annual Report for 1930, it shows net earnings per share available for dividend. In that column it shows the figure for the year 1930 as $10.44. That is, it says on that report that the net earnings per share are $10.44. That is a common expression. I cannot say that I could find it in the annual report of practically every company. I also referred to CR reports. I will read into the record the comparison that I referred to.

CR-51-A shows on line 46 for the year 1929, "Balance net profit after preferred dividends to average common stock, 10.21."

The effect on that comparison that I read into the record, if the surplus of the American Telephone & Telegraph Company had been $1,000,000,000 more than it actually was, and the stock premiums $500,000,000 more than they actually were, I think would be that it would not affect the

figure at all. In the way that I figure the amounts shown on Exhibit X-111, the bigger the surplus and the bigger the stock premiums, the more you would find that the stockholder was earning on his investment. That is according to the method I used, the bigger the surplus and the bigger the stock premiums, the greater the return that I would show that the stockholder was earning on that particular item of investment, as I have shown it in X-111 and X-113, which is only a part of the entire investment. The method followed by the company, which I have called attention to, in these CR's and in the annual reports, may be different from the method I follow, but the expression is the same, as I understand it. Of course, they did not go at it in that way, they [fol. 7648] did not apply any formula to get the answer. I realize that.

I understand that for two days we went over the question of whether the formula that I did use was an incorrect formula, and gave an upside-down answer. I remember that I finally stated that it was a fact that the more the stock premiums, and the more the surplus, the higher the return that I would work out on the investment from the same actual income on a particular item of investment, as I have used it here. As to whether there is no similarity whatever between what I have referred to here today in answer to Mr. Goldstein, and what I did in Exhibit Number X-113, the method is different, but I think the expression of return on stock is the same, except in one case I am working it out on the stock that was applied to a small item of investment, of the total; and here it is the entire stock of the company.

It seems to me that the difference in method and the difference in result is due to the fact that I took a part of the stock and not all of the stock. As to whether I would have gotten the same general result, that is, made it appear that the man who paid into the company $180 per share for his stock was getting a bigger return from the same amount of dividends of the company than a man who paid $100, I do not see that the comparison is exactly the same.

I do not think there would be any difference between the man who paid the $100 and the man who paid $180 in the way I have used the figures, because my calculation was worked out on the par value of the stock rather than on the surplus, and premiums, in addition to par value. I remember I performed a little computation for you, I remem-

ber that I increased the surplus of the company by $1,000,000,000 and that I increased the stock premiums by $500,000,000. I remember that as a result of that I got 140.77 per cent instead of the 59 per cent that I showed on Exhibit X-113.

(Witness excused.)

[fol. 7649] W. M. HAMMOND, a witness on behalf of defendants and having been previously duly sworn, resumed the stand for further re-cross examination by Mr. Blackman and testified as follows:

Recross-examination.

By Mr. Blackman:

June 29, 1932.

I prepared Defendants' Exhibit X-343. That was the paper that I prepared at your request when I was on the stand before. On this sheet, I compare triple A bonds of the Bell System with triple A bonds of the railroads and other utilities. The results that I get by this method compare with the results on my summary sheets, Exhibits X-227 and X-228 and X-229 as follows:

Exhibit X-227 and X-228 reflect the same figures as appear in Exhibit X-229, the tabular statement, so that I take it that a comparison of the one will cover the entire subject.

I will compare the triple A issues with the corresponding periods, and the corresponding classes of business in Exhibit X-229, which embraces all of them together, all classes of bonds.

In the year 1923, on Exhibit X-229, the Bell System, costs to company figures was 5.72. On Exhibit X-343, the yield on triple A is shown as 5.33. The same year the railroad issues on Exhibit X-229 show 5.50 and on Exhibit X-343 they show 5.24. The public utilities, the same year, 1923, on Exhibit X-229, show 6.03 and on Exhibit X-343, they appear as 5.77.

For the year 1924, on Exhibit X-229, the Bell System figures are 5.70, and on Exhibit X-343 there are none, there being no Bell issues of triple A bonds in that year.

In 1925, on Exhibit X-229, the Bell System figures are 5.44 and on X-343 they are 5.19. In the same year the railroads are 5.61 on X-229 and 5.17 on X-343, and in the same year,

1925, the public utility issues are shown as 5.62 on Exhibit X-229 and 5.24 on Exhibit X-343.

In 1926, on Exhibit X-229, the Bell System percentage is 5.02 and on Exhibit X-343 it is 5.02. The railroads for 1926 in Exhibit X-229 show 5.26, whereas in Exhibit X-343 [fol. 7650] they are 4.75. The public utilities in 1926, the percentage on Exhibit X-229 is 5.52, while it is 5.08 on Exhibit X-343.

There are no Bell issues in 1927 or 1928 of triple A class.

Exhibit X-229 shows a percentage of 5.33 for the Bell System, in 1929, and in Exhibit X-343 the figure is 5.33, the same. The railroads in 1929 on X-229 show a percentage of 5.27 and on X-343, 4.82. Public utilities in 1929 on Exhibit X-229, 5.29, while on Exhibit X-343 they show 4.93.

In 1930, on Exhibit X-229, the Bell System percentage is 5.21, and in Exhibit X-343 it is the same. In the same year for railroads in Exhibit X-229 the percentage is 4.90, while in Exhibit X-343 it is 4.80. The public utilities in the same year, 1930, are shown as 5.04 in Exhibit X-229 and as 4.88 in Exhibit X-343.

I have summed up these figures at the bottom and give both the arithmetical average and the weighted average in Exhibit X-343. In each case, the yield on the securities of the Bell System is somewhat higher than the yield on either the railroads or the public utilities.

My other table shows the yield to the public based on the offering price. I get the same result there, that is, the yield on Bell securities is higher, showing that the bonds sold at a lower price compared to the yield than either the railroads or the other public utilities. There is a small difference in that direction. The years 1921 and 1922 are used on the combined issues. I left them off of this one (X-343). There was no purpose in making a distinction other than this; I started with the idea of covering the period from 1923 to date, and then decided that I had time to carry it back a little further with reference to the whole, but did not have ample facilities to extend it further in the time available.

Not having gone into the figures, I do not know whether if I made out a table that was comparable to those sheets, I would have shown a greater difference between the Bell securities and the other securities than I show on X-343. I made no classification according to Moody's ratings prior to

1923. In figuring up the table asked for I did not test out what the effect would result from the inclusion of 1921 and 1922. I would not be able to do that without making a complete classification.

[fol. 7651] Re-reredirect examination.

By Mr. Goldstein:

In the two years, 1929 to 1930, in which the Bell System securities cost to the company was higher than that of the public utilities, the percentage of total money received by the Bell System in those years was 100 per cent triple A money. The percentage of triple A money received by the public utilities, 1929, was only 5 per cent of the total, and in 1930, 13.3 per cent of the total. The ratio of triple A money, double A money and A money and BAA money, that constitutes the total funds, will have a very important effect upon the cost of funds to the company.

Re-recross examination.

By Mr. Blackman:

The experience by which I know that, is a study of statistical matters coming under my experience, public utility financing. I took my last answer on redirect to refer to the aggregate financing of a company by bonds. The cost of money is higher on the lower grade bonds.

A company seeking to raise a given amount of money, or rather to do its financing by bonds, regardless of the amount, if it covers its entire requirements by about 25 per cent in bonds, the bonds being in that proportion with the usual relationship of earnings and equity, gives the bonds a very high character and consequently a low cost. A company with a much larger proportion of bonds of a miscellaneous character will usually pay a much higher average rate because of the fact that it is not only a lower grade, but a larger volume, and that is what is reflected in this statement, is a large volume, as well as the low grade.

Within reasonable limits, as the volume increases, the price that the company is able to sell the bonds at, goes down, even though the bonds may be perfectly good; that is, if you go beyond the customary limits, of probably 50 per cent bonds, or approximately that. I would not say it would make a great deal of difference in low ranges of about 25 per cent of bonds to the total, but you do reach a point

which cannot be measured in a certain percentage with respect to all companies.

[fol. 7652] If a company is issuing triple A bonds that represent only 20 per cent of the value of its property and the company issues at the same time or later, lower grade bonds, it may not have a direct relationship in a given case on the selling price of those bonds although the fact that a company has junior bonds outstanding, places it in a less stable position than if it has only stock under its high-grade bonds. There is the danger of foreclosure and default which does not obtain if there are no junior bonds or lower grade bonds. I think it would have some effect to pull down the sale price of the triple A bonds. I see no basis for putting it up.

I could not answer intelligently whether if one company in an industry issued a lot of low-grade bonds that would have any effect upon the selling price at which another company in the same industry might issue triple A bonds. You are comparing different companies now which might occupy absolutely different positions. They are not comparable, that is, unless I knew the elements that would otherwise make them comparable.

I think without question a given company can obtain its money lower, if it is in a position to issue only triple A bonds, than if it has to issue a lot of miscellaneous lower grade bonds. I do not think there is any question about that.

As to whether the price at which it can sell its triple A bonds is affected by the issue of lower grade bonds, I can only say again, I believe that a company issuing only triple A bonds can obtain a better yield on the money that it might be necessary to raise, than if it must issue a lot of lower grade bonds to raise the funds. I think the fact that a company is issuing high-grade bonds and low-grade bonds, we will say triple A bonds and BA bonds, has an effect upon the price at which it can market its triple A bonds. The triple A bonds would probably not enjoy as much favor among investors as if it had only triple A bonds.

Whether the comparison that I am making here, even on the basis of triple A bonds, is a little unfair to the Bell System, because their bonds were all of a high grade, I can answer only by saying that the bonds are all of a high grade.

If the railroads had issued only triple A bonds, and

[fol. 7653] the other industries had issued only triple A bonds, I would expect to find the yields on those bonds lower and the prices higher. If they had only triple A bonds, I think there would have been a tendency in that direction. If the railroads, for instance, had issued only triple A bonds, I would expect to find their total money, obtained by bonds, lower.

June 29, 1932.

STIPULATION RE EXHIBITS

It was stipulated as follows:

That the method used by Mr. Rainwater of converting the per cent return to the A. T. & T. Company, to percentage of return to stockholders of the A. T. & T. Company, upon their investment in the stock of that company, is used in each of the following exhibits: X-111, 112, 113, 114, 115, 118, 127, 134, 272, 273, 274, 276, 278, 282, 280, 294 and 337.

The average loans of the American Telephone & Telegraph Company to the Illinois Bell Company and other licensee companies based on the figures developed by Mr. Rainwater, and which he has already testified about, appear also in one form or another in the following exhibits: X-131, 132, 133, 134, 135, 136, 137, 142, 143, 144, 145, 146, 147, 273, 274, 279, 281, 282, 284, and in 285, except that they do not appear in pages 1, 2, 3, 4, 9, 10, 11, 12, 17, 18, 19, 20, 21 and 22 of that exhibit; also X-296, 297, 298 and 340, except for page 4.

The method of Mr. Rainwater in making comparisons of the combination of interest and dividends which was referred to in the cross-examination occurs in each of the following exhibits: X-132, 133, 134, 135, 137, 142, 143, 273, 274, 281, 282, 284, 285, except for pages 1, 2, 3, 4, 9, 10, 11, 12, 17, 18, 19, 20, 21, 22.

"Mr. Blackman: At certain places in the record the witness testified that the figures had been furnished to him by the company. Later he said that no figures had been furnished to him by the company. Of course, we contend that we never furnished the figures for the purposes for which they have been used, and if they wish to prove what they did say we furnished and the circumstances, of course, it is open to them to do it, but I shall move to strike out

[fol. 7654] from this witness' testimony the various places at which he said that he had taken these figures from the company and that the company had furnished them to him, in view of his statement later that he got nothing from the company.

The motion is to strike out his statements that the company furnished him these figures, on the ground that on cross-examination he testified that the company did furnish him no figures.

I am not accusing the witness at that point of having made a statement that was not true or contradictory. He merely made a general statement that he got it from the company and on cross-examination I said, "Did you personally get any of these figures?" and he said "No." They all came through counsel.

The Court: Strike out the testimony—the statement that he received the exhibits—he received the figures from the company and in place of it substitute that he took the figures from City Exhibit 142-A or whatever the exhibit is that was furnished by the company—was furnished to counsel at counsel's request for the information made up in that way."

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[fol. 7655] HAROLD D. ARNOLD, a witness for defendant:

Direct examination.

By Mr. Haight:

I reside 174 Summit avenue, Summit, New Jersey; I am Director of Research of Bell Telephone Laboratories, Inc.; attended college at Wesleyan University, Middletown, Conn., and later at University of Chicago, specializing in physics and mathematics, and receiving degree of Doctor of Philosophy in 1911; I have been since then employed continuously in substantially present line of work; I was first employed in Engineering Department of Western Electric Co., beginning January 2, 1911, to do research work in vacuum tube devices.

In 1925 Bell Telephone Laboratories, Inc., was established, which continued the same class of work done by the Engineering Department of the Western Electric.

I have had contact with the Department of Development & Research of the A. T. & T. and became familiar with the

personnel of that department in 1911. I don't know when the name "Department of Development and Research" was given. I sometimes discuss problems with the members of the Department of Development & Research of the A. T. & T., primarily as such problems relate to my own work and not as they relate to theirs; so I have no familiarity with that department's own problems.

The Bell Telephone Laboratories, Inc., does engineering and research work in telephone communication. There are possibly four sources from which problems arise in my own work with the Bell Laboratories, and those are directly from [fol. 7656] the A. T. & T., from Western Electric, from work in my own department and from work of other departments in the laboratory. I should add also Electrical Research Products Corporation as a source.

I am not familiar with the organization or function of the Electrical Research Products, Inc. (called for convenience E. R. P. I.), but I know it is concerned with motion picture engineering and consulting work in acoustics.

My department in the Bell Laboratories is known as "Department of Research." The other departments are the Systems and the Apparatus Departments and a group of general departments including Educational, Accounting and Publications. The Systems Department deals with problems of associating apparatus and systems for telephone use. The Apparatus Department designs and develops specific communication apparatus. I am not, however, familiar enough with that department to name many kinds. However, I do know that they design loading coils, relays, ringers, transformers, repeating coils, retard coil, dials, subscribers' equipment, which includes Bell boxes, and other apparatus of that nature; telephone cables, phonograph recording apparatus they design; talking motion picture equipment; I don't know whether that department does research work in respect to talking motion picture equipment because it is difficult to define the term "research work," but as I understand it, research means the study of substantially new things or substantially new ways of looking at old things.

I don't know whether that department has to do with both theatrical and non-theatrical apparatus, but it does have to do with recording apparatus, reproducing apparatus in connection with talking motion picture equipment.

My department does not directly or indirectly have any-

thing to do with the recording apparatus in connection with talking motion picture equipment except answering questions of a general nature from time to time at the request of other departments and in connection with answering such questions we make inquiry, research or investigation. At one time or another I think we have done research work with reference to all that have been mentioned.

[fol. 7657] Work has been done in connection with the research or design by the departments of the Bell Laboratories with public address apparatus, not, however, with regard to the apparatus itself in its commercial form but as to some of the principles that underlie the operation of such apparatus.

I do not understand the term "electric phonographs for theatres" but I do not think that my department has had anything to do with those because we do not make electric phonographs for theatres, nor does the Bell Laboratories have anything directly to do with electric phonographs for broadcasting stations, but my department has answered questions with regard to such devices and in connection with the answering of questions has performed certain experiments.

Bell Laboratories has had something to do with amplifiers for submarine telegraph cables, having studied the principles underlying their design and having designed such amplifiers. It has studied the principles and made some designs of multiplex telegraph on submarine cables. We have made tests on submarine cables and have used testing apparatus of our own design. We have done research work in connection with that subject. We have studied picture transmission apparatus and designed it; also hearing aids, such as pick-up transmitters, amplifiers and receivers.

Under the term "deaf apparatus" and "audiophone," I usually think of a combination of receiver and amplifier and transmitter.

We have studied the principles of electrical stethoscopes and have designed some.

I do not recall that any of the problems in connection with any of the subjects, the apparatus of which I have mentioned, have come to the Bell Laboratories from the Development and Research Department of the A. T. & T. I wish to modify that. Some of these matters did come from the Department of Development & Research of the A. T. & T., such as transmission of pictures, and phonograph re-

cording apparatus. I do not remember in exactly what form that problem came to us. I do not recall that any problems in connection with talking motion picture equipment came directly from the Development & Research De-
[fol. 7658] partment of the A. T. & T. The same as to public address apparatus for theatres—I do not know its origin.

I do not know anything about the origin of electric phonographs for theatres or for broadcasting stations, nor do I remember the origin of amplifiers for submarine telegraph cables nor terminal apparatus for multiplex telegraphy and submarine cables or testing apparatus for cables.

Picture transmission apparatus came from the Department of Development & Research, A. T. & T.

Certain work with regard to hearing aids did come from the Department of Development & Research, A. T. & T., but I cannot recall what those problems were except that some problems relating to the use of hearing aids on subscribers' equipment for deafened telephone subscribers came to us from that department. I do not remember any other department of the A. T. & T. from which any of these came.

The problems coming from the Western Electric Company related to matters of materials and manufacturing procedure and the design of apparatus, including carbon for telephone transmitters, alloys for use in various processes, including magnetic materials and non-ferrous materials, insulating materials used on conductors and many problems relating to apparatus designed.

Some of the work originating with the Western Electric had to do with insulating material for conductors, but I don't know over what distances such conductors are used, but I have every reason to believe that they are used for all sorts of distances, long and short, and the same is true with regard to other work that I am familiar with and have mentioned; as far as I know, every piece of telephone apparatus can be connected with telephone circuits of any length.

I have mentioned all of the things that I can think of at the moment originating with Western Electric.

With reference to repeaters, Bell Laboratories developed and designed them. I don't know in what kind of service they are used. All I know is that they are used for repeating telephone conversations but I am not familiar with the telephone plant, only that they are used in a telephone plant. Repeaters are used in many places, in fact wherever

[fol. 7659] amplification is necessary, but I don't know enough about the operation of the telephone plant to be able to distinguish between long distance use and other uses.

I have not attempted to answer with respect to the work in the other departments of the Bell Laboratories the work originating with Western Electric.

The work in my department sometimes comes from the Apparatus & Systems Department as there are frequently investigations which lie somewhat outside of their own specific line of work and about which they consult my department. These problems are rather small problems and have to do with questions of mathematical and chemical analyses and in some cases relating to the transmission of speech through certain pieces of apparatus as to whether this apparatus would affect the quality adversely.

I remember one problem which originated with the E. R. P. I. on the measurement of the absorbing power of acoustic materials, and one on the recording of speech on film, and one on the recording and reproduction of speech from phonograph records.

There was another problem I remember relating to insulating materials for submarine cables and a related problem of magnetic materials that related to submarine cables.

My department's work is related to a study of the principles underlying the recording of speech on films and a survey of the possibilities and relative desirability of different methods. The earliest work on that problem that I can recall began about ten years ago. However, the work arising from E. R. P. I. came about four years ago, but work of a general nature on that problem began I think about ten years ago. The request then came from the Development & Research Department of A. T. & T. and was work in connection with the study of the nature of speech on telephone wires. That was before the present company was organized. The work at that time was done by the Engineering Department of the Western Electric. I have not in answering questions and speaking of the subject matter heretofore, made any distinction between Bell Laboratories and its predecessor, the Engineering Department of Western Electric.

In connection with the study of the problem of reproduc- [fol. 7660] tion of speech on phonograph records, we investigated the fundamental underlying principles and made

some experiments and designed apparatus for that purpose, which work ran over a period of eight or nine years.

On the question of insulating materials for submarine cables, we studied various properties of such materials. On problems of submarine cables that are not lead covered, we worked on those probably ten or fifteen years.

Bell Laboratories or its predecessor, Engineering Department of Western Electric, has worked on radio. My own department carried out experimental work and studied the principle of radio and the design of equipment. My department has particularly studied vacuum tubes, and upon that I have worked myself. The work began in 1912, having been continuously and still is in progress. That work has resulted in the use of vacuum tubes in the communication industry. Vacuum tubes are used in connection with telephone repeaters, radio transmission and reception. These are the principal uses.

The work that is completed in my department usually leads to the design of equipment for communication purposes and the information developed passes on to one of the other departments, Apparatus or Systems or both, for use in their jobs. In general the work of my department precedes or consists of the early stages of the consideration of new things for the communication industry frequently, pointing to the desirability of new or different apparatus, and the development of such apparatus falls into the Apparatus Department, such apparatus ultimately taking a part in the communication system, and has to be properly associated with other apparatus. The work of association falls into the Systems Department. The work of my department, for the most part materializes through those other departments.

There are about 1,000 men employed in my department. I don't know the number for the other departments. There is associated with the Department of Research under my administration a shop for the manufacture of vacuum tubes, and that shop has mechanical people whose numbers vary from time to time. I have not included that number in my statement. There are about 300 employed in the vacuum [fol. 7661] tube shop now. The maximum number in that shop has been about 1,000. At its start there were very few people—about 100.

The vacuum tubes are manufactured for the Western

Electric except such as are used for experimental purposes in the Bell Laboratories.

There are not any industries dependent for being on vacuum tubes, but such tubes are the basis of the present telephone and radio plants. There are very many purposes for the vacuum tubes, but they are used generally for the purposes of amplification and in the talking motion picture industry. I don't know whether any of these products are given a name to distinguish them from telephone apparatus generally, but we frequently speak of some of these things as by-products, such as those things which have indicated usefulness for some purposes outside of the communication industry, and in that class come certain developments of the phonograph and talking motion pictures. There are undoubtedly others much smaller in number.

I don't know of any publication that would help in listing those things. Members of our company publish scientific articles. It puts out a magazine called "Bell Laboratories Record" once a month. I don't know whether the Department of Development & Research, A. T. & T., has a publication of that same general nature.

I don't know who owns the stock of the Bell Telephone Laboratories. (It is conceded by counsel for the plaintiff that the stock of the Bell Telephone Laboratories is owned half each by Western Electric and A. T. & T.)

The laboratories charges for the work done and such charges are determined by certain processes that are set up in the Accounting Department by which the time of employees is allocated to specific projects as a basis for charges. I don't know exactly how overhead is charged or allocated. The work is charged entirely on a time basis without regard to the character or the results of the work.

Some undertakings we work upon fail. I have no way of determining the relation of failures to successes, except that the successes are enormously in the preponderance, which is due to the fact that we watch very carefully and promptly, [fol. 7662] if any project shows evidence of not succeeding, we stop it. Our aim is that the non-promising things be killed early. I don't think it would be possible for any records to determine the relation of failures to successes.

Very frequently work has already been done upon projects coming to us from the various sources mentioned, as for instance the Department of Development & Research of

the A. T. & T., the Western Electric Co., etc. In almost all cases some progress has been made on the problems that come to my department and that progress has led to the point where experimentation, and by that I mean work with actual apparatus, is indicated as desirable, or necessary.

Such is true of the problems coming from Development & Research, A. T. & T. With regard to work coming from the Western Electric, it has apparatus and facilities for experimentations. The problems coming from them usually require peculiar apparatus or peculiar processes of experimentation that we are equipped to carry out better than they. Now I am speaking of the work in my own department.

The problems from E. R. P. I. come in the form of a statement of requirements for apparatus to meet. Sometimes there have been experiments by E. R. P. I. as to such problems.

The problems that come from Development & Research, A. T. & T., have usually received careful engineering attention, which includes not merely a statement of the functions that are desired to be obtained or the apparatus that is desired to be developed, but also includes a careful study of the ways in which such results might be obtained up to the point where experimentation is called for.

With respect to E. R. P. I., there is not the same degree of engineering consideration given to their problems when they come to us.

There has been some winnowing out by the Development & Research of the A. T. & T. and by Western Electric which decreases the percentages of failure with respect to the problems coming to us from them.

Occasionally people are transferred from Development & Research, A. T. & T. to Bell Laboratories, and vice versa. [fol. 7663] The numbers are not large; sometimes loans, sometimes permanent.

Shortly after the time when we started on motion picture development certain people were transferred from my department to other departments and also to E. R. P. I. As to my department, there was no transfer from Development & Research, A. T. & T., to Bell Laboratories, and I do not know of any such transfers with respect to other departments of the laboratories.

Among the requests coming to Bell Laboratories for work

from the Western Electric I recall none for work for the Graybar Co.

Mr. Moravec has charge of the records which show the sources of requests for work in my department. I do not know in what form they are kept, and some records were kept when the laboratories were in the Engineering Department of the Western Electric.

There was some work in connection with the Western Union Telegraph Co., but I do not recall just how the work originated. I do not know of its doing any work for the Postal Telegraph & Cable Co. My department has done certain work in connection with Northern Electric engineers, but always at the request of Western Electric. We must certainly have done work in my department for International Western Electric but I do not recall it now. I don't know as to the International Standard Electric. We have done some work for the U. S. Government. I don't recall any work done for the Automatic Electric Co.

I don't know whether the Western Electric makes any profit on work done for it. Some of the work done by Bell Laboratories extends over a great period of years, such as work on vacuum tube development. The first tubes became of practical use in 1913, and since that time there has been constant work and progress, so that now the tubes are altogether different and better than those of the earlier years. The same is true in regard to the studies of the characteristics of telephone speech and the requirements for the proper transmission of such speech. Those problems have been in constant progress during twenty years, to my knowledge, and year by year there have been changes in prac- [fol. 7664] tice and some improvement in results and they are still in progress.

Vaccum tubes were first used between New York City and Washington in 1913 and for continental telephonic communication in 1915. The work prior to 1913 on the specific tubes that were used had gone on for about a year, and upon the general subject, to my knowledge, since I came with the company in 1911. There had been work done on tubes prior to my coming with the company.

There have been instances where work was begun in a certain year and did not come into practical use for seven, eight or ten years thereafter. For instance, development of magnetic materials which found their great usefulness in loading coils—the early work on those alloys certainly

preceded the use of the apparatus by more than the period of seven or eight years.

Another example is the study of insulating properties of materials used on wires which were studied over a considerable period of years and during recent years there has been a considerable change in the process we used as a result of that study. That inquiry and investigation extended for seven or eight years before the results were put into practical use.

Frank B. Jewett is president of the Bell Telephone Laboratories and vice president of the A. T. & T. in charge of its Development and Research Department. I have been Director of Research of the laboratories for about six years. While I was in the engineering department of the Western Electric I was called research engineer.

The problem in a repeater is to add energy to a voice current that has faded away as it goes along a telephone line, so that it can go on from that place with greater power, and the difficulty of the problem resided in getting something that would work fast enough to respond to the high frequency currents that constitute speech, and the occasion for solving the problem was to extend the reach of telephone communication. From New York to San Francisco there are probably 15 to 50 repeaters, depending on the type of construction. The type of repeater used in the Bell System is the vacuum tube repeater. The vacuum tube repeater enters into the problem of transmis-
[fol. 7665] sion in the manner that I just broadly described.

Since 1923 the principal improvement in vacuum tube has been to get a repeater that operates with much less power supplied to the filament which results in a very large saving in the power equipment necessary in a telephone exchange. Coupled with that, is another important improvement in the length of the life of the repeater itself, which has been extended to something like 35,000 hours of continuous service. Consequently, repeater bulbs expense is lessened and the service may be given more continuously through them, since with longer life they are not subject to interruption to the same extent.

Another outstanding development since 1923 has been permalloy, which is a magnetic material of extraordinary properties used in loading coils. Another is the crystallization of the telephone hand set.

It is substantially since 1923 that the transmitter and

receivers and assembly of the present telephone hand set has been perfected.

Since 1923 we have obtained better dielectrics for use in condensers and better arrangement of the materials in condensers such as improvements in the enamel insulation on enamel insulated wire; improvements in the finishes for telephone apparatus; improvements of a mechanical nature resulting in longer life, and improvements in contact metals which form an important part of telephone systems and the development of special relays which will operate with the very small currents that we have in the telephone plant; improved carbon transmitter of the telephone set; improvement in the circuits of subscribers' apparatus particularly in connection with the elimination of side tone in telephone receivers; improvements in net works and filter design to correct for the detriment that voice currents suffer in going over the telephone lines; improvement in optical methods of recording speech, which, for example, are used in our apparatus for mechanically speaking numbers called on the dial telephone.

Condensers are used in subscribers' telephone sets and very widely in the electrical art, but the condensers upon which I have worked have related to the communication industry, that is, transmission of intelligence by means of [fol. 7666] electrical currents, including radio, signalling through the telephone system at whatever frequency is carried, television, transmission of pictures. I do not include talking movies. I would include the operation of telegraphy over a system.

All the work that we have done in the phonograph field has come to fruition since 1923; also aids for the hard of hearing, and talking motion pictures; and some of the work connected with public address systems, which is a system or device whereby a voice or program is made audible to a large audience by electrical means, including microphones, amplifiers and loud speakers, has fallen within that period.

My department has never done anything with reference to teletypewriters or telegraph typewriters. I don't know whether other departments of the Bell Laboratories have.

My department in 1923 I think had about 300 or 400 people in it. The occasion for the increase from that time to now has been the growth in the numbers of problems of the various kinds I have mentioned.

The same or substantially the same divisions or departments have existed in the Bell Laboratories since it was organized, making allowance for the changes in personnel and work. The principal difference between the Research in my department of the laboratories and the research of the Development & Research Department, A. T. & T., is that Development & Research A. T. & T. does not make use of experimental apparatus to any considerable extent but conducts its experiments with facilities that exist in the telephone company, whereas in my department, the majority of all the work is carried out with experimental equipment, laboratory apparatus facilities, power supplies, motors, balances and that sort of thing that are special to the work and frequently have to be specially designed and manufactured for the work. My company has more than one building in the sense of occupying space in more than one building. We have some small laboratory buildings in the field which we use for radio experimentation solely. We have no laboratory devoted solely to television. We have a part of a building that we devote solely to talking pictures. It is a building attached to the main building. It is on the Bank Street side of our laboratory group. It [fol. 7667] has about three stories but I don't know the floor area.

There have been only one or two cases when one of my department's men have gone into the field to observe the operation of talking motion picture equipment. I don't know about the sending of men from other departments.

The work in the talking picture building is in connection with the recording and reproducing of speech from films and other records, and new devices are tried out there which is a large part of the work done.

My understanding is that E. R. P. I.'s principal business is talking motion pictures. Probably some half dozen men went from my department at one time or another to E. R. P. I.—one or two were scientists and the others were laboratory engineers or assistants. No men were sent from my department to Western Electric in connection with talking pictures. I don't know as to other departments.

The period prior to 1923 saw the growth of the vacuum tube from an apparatus that was difficult to manufacture with uniform characteristics, into one that could be manufactured with great uniformity. It saw the settlement of

the major features of rough design which allowed us to produce tubes that were fairly satisfactory for our purposes. That period was a period of blocking out the problem of vacuum tube design and of obtaining some of the fundamental information about the production of vacuum tube filaments and some of the information about the operating characteristics of vacuum tubes. The period from 1923 on has been more nearly a period of perfecting these devices and making them cheaper and more satisfactory in service; also, from 1923 on, new principles of vacuum tube manufacture have been found and some entirely new lines of work have been started in connection with the arrangement of the parts inside the tube to make them function better.

Referring to telephone hand sets, they have been used for particular purposes as long as my memory runs in the telephone plant, but these hand sets were not satisfactory for use by the public on ordinary subscribers' premises. I cannot point to any time that work on the modern hand set may be said to have been started. It has been an evolution rather than a specifically started development. There has been work on hand sets all the time [fol. 7668] since my first connection with the Western Electric. Satisfactory hand sets first came into commercial use within the last five years, I should say.

The research work done is budgeted during the last two or three months of each year. The budget is subject to revision at any time. On making up the budget I assemble figures for the coming year in view of the personnel and the problems that either have been authorized or appear to be in the process of arising. I believe other departments function similarly. Each project has a cost estimate associated with it which may be on a unit budgetary basis or in some instances may be an estimate extending over several years.

From a budgetary point of view the records are kept as to a prediction of expense on projects and as to the actual expense incurred and these records are reviewed frequently in the course of the project. There is no set custom as to the making of reports on each project at particular times.

The number of people in my department has been diminishing, which includes expense also.

In carrier current systems the signal which is transmitted

is carried by a high frequency alternating current and by high frequency I mean a frequency high with respect to the signal. If the signal to be transmitted is itself a low frequency current, then the carrier current may not be very high. In general one thinks of an example of carrier current operation as one in which an alternating current of perhaps 7,000 or 8,000 cycles is modulated by a voice current and this modulated high frequency current is transmitted through the system and then at the end of its journey is demodulated and restored to intelligible speech.

The carrier current system allows the transmitting of a large number of telephone currents, telephone conversations, over the same physical plant, over the same wires in the telephone company's plant and thereby saves the expense of the addition of wires as the traffic increases. I don't know whether carrier current systems are used in local exchanges.

In the course of research and development work, inventions are made upon some of which patents are secured. I neglected to mention the patent department in listing the departments of the Bell Telephone Laboratories. When [fol. 7669] we suspect or hope that we have made an invention the material relating to it is submitted to the Patent Department for appropriate action and there it is handled so far as the prosecution of the application for the patent is concerned. There is a Patent Department in the A. T. & T.

The engineering work of the Western Electric is carried on under some other name than Development & Research, but I don't know what it is.

Mr. John G. Roberts is head of our Patent Department and has been since the incorporation of the Bell Laboratories.

I don't know anything about the handling of charges in connection with that work. I have taken out several patents myself, a few on radio, I don't know how many. Our Patent Department keeps lists of the various patents secured and applications filed.

I know Mr. H. A. Appel. He is connected with Development & Research, A. T. & T. Mr. R. M. Allen was with the Western Electric Co. Mr. H. W. Nichols, who died about six years ago, was in the Engineering Department of the Western Electric. W. L. Betts is an employee of the Bell Laboratories. O. B. Blackwell, Development &

Research, A. T. & T. R. Bown same; O. E. Buckley, Bell Laboratories. G. A. Campbell, Development & Research, A. T. & T.; J. R. Carson, same. I don't know G. Cirsson. L. M. Clement was at one time in the Engineering Department of Western Electric; A. W. Kishpaugh, Bell Laboratories; E. H. Colpitts, Development & Research, A. T. & T.; I. B. Crandall has been dead several years, he was formerly in Bell Laboratories; A. M. Curtis, Bell Laboratories; H. C. Edgerton, at one time Western Electric, I don't know about him of late years; G. W. Elman, Bell Laboratories; C. R. Englund, same; L. S. Espenschied, Development & Research, A. T. & T.; A. L. Fitch was at one time Engineering Department, Western Electric; I don't know where he is at present time. J. O. Gargon, I don't know; A. Haddock was at one time Laboratories, I think not now; R. E. L. Hartley, R. A. Heising, M. J. Kelly, B. W. Kendall, W. H. Martin, R. C. Mathes, J. Mills, A. M. Nicolson were at one time in Bell Telephone Laboratories; H. S. Osborne, Operation & Engineering, A. T. & T.; H. W. Read was at one time Western Electric; I don't know where he is now; W. L. Richards, who died [fol. 7670] a couple of years ago, was with the Bell Laboratories; J. C. Shelling, E. O. Scriben, H. E. Shreeve, L. J. Sivian, E. R. Stoekle, H. N. Stoller, now or formerly with Bell Laboratories, H. J. Van der Bijl was at one time an employee of the Western Electric; K. S. Van Dyke, Development & Research, A. T. & T.; H. W. Weinhart, R. H. Wilson, W. Wilson, J. P. Schaefer, Bell Laboratories; P. I. Wold was at one time in Patent Department, A. T. & T.; also at one time Laboratories.

Practically all the patents that have been issued to me relate to telephone communication, the first ones to a telephone repeater known as the mercury arc repeater, and subsequent ones related to the vacuum tube repeater; do not recall them in detail. I am quite sure that these inventions of mine have been used in repeaters or in radios or in both.

I will check over and ascertain whether the following named patents issued to me relate to and are usable in radio:

No. 1,114, 845 of October 27, 1914, electrical relays.

No. 1,128,279 of February 16, 1915, electrical wave amplifier.

No. 1,128,280 of February 16, 1915, thermionic detector.

No. 1,129,942 of March 2, 1915, gaseous repeater and circuits of low impedance.

No. 1,129,943 of March 2, 1915, same title.

No. 1,329,283 of January 27, 1920, thermionic amplifier.

No. 1,349,252 of August 10, 1920, methods of and means for utilizing thermionic current.

No. 1,354,939 of October 5, 1920, vacuum tube devices.

No. 1,367,224, February 1, 1921, radio receiving system.

No. 1,375,481, April 19, 1921, power modulator for radio transmission.

No. 1,398,665, November 29, 1921, thermionic amplifier.

No. 1,403,475, January 17, 1922, vacuum tube circuits.

No. 1,231,984, July 3, 1917, H. W. Nichols and H. C. Arnold radio transmission.

A dollar is supposed to be given to employees for each patent taken out by them on inventions, but I have never seen the dollar.

(For deposition of George A. Campbell, see Abst. Vol. IV, pp. 1230-39.)

[fol. 7671] LYMAN F. MOREHOUSE, for defendants.

Direct examination.

By Mr. Haight:

I reside at Montclair, New Jersey; I am Equipment Development Engineer, A. T. & T., and have been since 1909; prior to that from 1906 to 1909 I was with Western Electric Co.; prior to 1906 for four years I was at University of Michigan on Physics and Electrical Engineering Faculty, and prior to that with Washington University at St. Louis for a year in the Department of Physics, doing instructing work. Prior to that time I was instructor in mathematics and physics and later acting principal of the Marquette High School, Marquette, Mich., and instructor in mathematics and other subjects in Detroit Central High School. At the University of Michigan I was instructor and later assistant professor of electrical engineering.

While I was with the Western Electric, for a few months, I was in the laboratories in Chicago and then I was sent by that company to London and was connected with the Lon-

don house for about three years as transmission engineer in Europe.

When I first came to the A. T. & T. from the Western Electric I was Equipment Engineer until July 1, 1919, when I became the Equipment Development Engineer, which is my present title. I am the head of one of the departments of Development & Research, A. T. & T. My so-called department may be called a division of Development & Research Department, being the Equipment-Development Division. The Engineering Department of the A. T. & T. did the work of the Development & Research about July, 1919. Prior to July, 1919 the Engineering Department of A. T. & T. included work of the character done by Department of Development & Research since 1919.

The engineers of the Equipment Development Division carry on studies either directly or through the engineers of Operation and Engineering as may be necessary to determine the needs of the associated companies for new central office and sub-station equipment—more particularly that part which has to do with switching and signaling. Studies are also made to determine what should be the requirements [fol. 7672] of new system equipment for apparatus in order that it can be effective and enable the Associated Companies to meet service problems in the best way. In general that relates to all switching apparatus, to the sub-stations apparatus, except transmitters, receivers and induction coils. Mr. Blackwell, the transmission development engineer, does work on the transmissions, receivers and induction coils.

The work done by my division results in equipment manufactured and sold by Western Electric. Our problem is to determine the requirements. After the requirements have been determined by my division for some new piece of apparatus or system or equipment, the next step is to determine the specific requirements which should be met. Then they are formulated and sent to the Laboratories which develop the apparatus or system required. When that work is satisfactorily done, it eventuates in equipment which the Western Electric manufactures for the Associated Companies.

The job of the Equipment Development Division is to determine upon requirements and upon the need for a new thing. We study all the needs of the companies in the field. We make investigations and studies. In some of those

studies we have occasion to call upon the Laboratories for some assistance because we cannot always tell beforehand whether a system that we may visualize at the start, is a practical sort of thing. But having gone through the necessary processes, we finally determine as to the requirements which are rather specific and definite enough so that the Laboratories know pretty definitely exactly what it is that we are trying to do. With that background and the requirements, they proceed to work out the system.

The process of setting up requirements gives contacts between ourselves and the laboratory so that they have a pretty good idea by the time the requirements are formulated. These requirements are definite and specific enough so that the laboratories can produce what is required. They then design or develop the system, the circuits, the switchboard, the apparatus.

For example, we might take the case of a switchboard, private branch exchange board, where in looking over the field we come to the conclusion that a different type would be beneficial to the companies. A study of the company's use of private branch exchanges of the types of things that [fol. 7673] have to do with private branch exchanges is made; in general, the features of the private branch exchanges, as to whether we want a lamp board, the size of the board, as to the capacity of the board, as to whether they should have tie lines from one private branch exchange to another private branch exchange, as to whether we should have long extension lines connected to that private branch exchange. All phases of the use of the private branch exchange are studied.

In connection with that we take into consideration the economic problems in connection with sales which is a fundamental part of our problem. From our relations with the field and the Operation and Engineering Department we have a pretty good picture of the number of private boards to be used when developed. We make an estimate and having determined what these requirements should be we then set them down as part of the requirements covering the development of the Private Branch Exchange. Those things then go to the laboratory, and in most all our problems we have consultations with the laboratories and finally there is nearly always a letter to the laboratory authorizing the development work, stating what we want to do, setting

forth the requirements in detail, which are the formal instructions to the laboratories.

The laboratories then analyze the problem, determining what seems to be required in the way of new circuits and new apparatus and lay their plans accordingly. The laboratories then develop that to the point where from the laboratory standpoint it appears that it will work. Then there is a review of what has been done to see whether the requirements have been met, whether our ideas of the cost of the board, of the performance of the board and of the future of the board have been met. I am speaking only of my division.

Sometimes we review that work with the laboratories. Sometimes we can answer the question from the results of the laboratory tests and from the work the laboratories have done—tests on apparatus and tests on circuits.

Cost estimates have been prepared to represent the manufacturing costs. Sometimes we go a little bit further and try out one in the field. If the results are satisfactory, a description of what has been developed is prepared. It is standardized and the Associated Companies through the Department of Operation & Engineering, A. T. & T., are [fol. 7674] advised. In the meantime the laboratories, when it is clear that that is the step we are going to take, proceed to prepare such information as is necessary for the Western Electric to manufacture the equipment which has been sent to them.

When I have said "standardize it," I meant standardize for the associated companies.

The Equipment and Development Division Engineers do not have to do with anything but Systems and Apparatus for the Associated Companies. When apparatus is standardized the Associated Companies buy it. The Equipment & Development Division does not do any work on by-products. I presume the Transmission Development Division may do work on by-products, perhaps the Outside Plant Division, although I doubt that.

Since 1923 there have been improvements in switching systems, in sub-station equipment and apparatus that we find in switching systems and in sub-station equipment. Prior to 1923 there were improvements in switching systems and in sub-station equipment all along the line. In the term "switch systems," include manual switchboards,

both local and toll, dial systems, panel and step by step, and private branch exchanges.

My division has studied prior to and since 1923 a little, the matter of broadcasting over wires, just as a matter of interest. A great many inventions were made in my division on which patents were obtained. They are coming through all the time; broadly, the switching and sub-station fields, which fields cover the entire scope of my division.

Some of the patents relate to the various features of the panel system and of the step by step system and of the manual system. Some relate to switching arrangements, some for apparatus and some to power plants. They are pretty generally scattered over the whole job.

The Equipment Development engineers have nothing to do with wire systems as such, but they have a great deal to do with apparatus which are used in connection with wires. The Outside Plant Development engineers have to do with wire systems. The Outside Plant Development Division is one of the divisions of the Department of Development & Research. The Outside Plant Development Division of Development & Research has to do with wires, cables and certain problems in connection with loading [fol. 7675] coils. The Transmission Development Division and the Equipment Development Division have to do with repeaters. The Transmission Development Division has to do with vacuum tubes and radio, of which Mr. O. B. Blackwell is the head. The Equipment Development Division had to do with the teletypewriter switchboard. No division had to do with talking movies. Television comes under Transmission Development Division. My own division directed the development of the teletypewriter.

(Note.—Stipulated that the signing by the various witnesses of their respective depositions and their swearing to them, are waived.)

Development work on teletypewriters began a number of years ago, twelve years or more. They are used by the Associated Companies for various classes of service and also in the long lines service. My impression is that the use of printers are used probably more by the Associated Companies at the present time than by the long lines and I feel that the use by the Associated Companies is going to grow very rapidly and they will use far more printers than the long lines.

In connection with my work, we study the needs of long lines for central office switching arrangements that the long lines use. The needs of long lines are discovered in the same way as we do with the Associated Companies, by studies and investigations which we make, also by problems as they present themselves, through the Department of Operation and Engineering and the Long Lines and the Associated Companies. We do not differentiate between the operating companies in our work as to long lines.

Service improvements in switching have resulted in benefit to long lines, such as switching systems and teletypewriters and arrangements that long lines use in connection with telegraph. The switching system means one or more switchboards worked out to afford a means for connecting lines together either local lines or local and toll, and such associated equipment as is required in central offices for the operation of switchboards and to give the kind of service which they are expected to give. I mean by that terminal room equipment. In switchboards we have improved signal arrangements, apparatus, cords, plugs, jacks, terminal room apparatus, cable inside the office, facilities to the long lines [fol. 7676] for connecting their switchboards to dial equipment where that is necessary, all of which have enabled the long lines to handle calls more rapidly and more accurately with less interruptions to service.

The determination that certain equipment originating with Development & Research Department, A. T. & T., and passed on to the Bell Laboratories is satisfactory, is done in our department and in making that determination we are in consultation with the laboratories and Operation & Engineering, A. T. & T., and we take advantage of every source or facility for making sure that we are all right. The man upon whom the responsibility of making the determination finally rests, is Dr. F. B. Jewett, head of Development & Research, A. T. & T.

The matter of making equipment standard is a pro-forma sort of thing. Systems are standardized by Development & Research Department, A. T. & T., having before it the ideas of Operation & Engineering, A. T. & T., of the Laboratories and any other department that would be helpful in reaching a conclusion.

There has been no occasion in my division to study broadcasting, except as previously stated.

Outside of the switching systems and teletypewriters I have spoken of I have worked upon repeaters and telegraph systems and telegraph operation, relating to long lines. Our problems with the central office equipment are just the same there as with local companies' equipment,—the study of the needs and development of the apparatus that is required to enable the long lines to give service in the best way possible.

Men in my department have taken out patents having to do with repeaters, teletypewriter systems, carrier telegraph systems and practically connected with every general class of central office apparatus.

Our particular job in my division in connection with repeaters is to get them into the telephone system; that is to provide such switching and such signalling arrangements and associated equipment arrangements as may be necessary to get the repeater transmission circuit into the system. My attention lately has been, broadly speaking, devoted to two kinds of repeaters, that is, the one that is used in the telephone plant and the one that is used in the tele- [fol. 7677] graph plant. A telephone repeater handles the voice waves with or without a carrier. In telegraph systems some of the repeaters handle the high frequency waves very much as telephone repeaters and the telephone voice waves, but there are other types of repeaters where we do not use carrier,—those are the older types. At the present time in telegraphy there is a carrier repeater and an ordinary repeator made up of relays.

My division does not have anything to do with cables for long lines, but we do have cable wiring inside the central office; nor does my division have anything to do with loading coils. In my division we do not charge any one for the work that we do. Time is allocated to classes of work. There may be one or more jobs in each class, such as central office panel system circuits as one class, panel system apparatus another class. There are six or seven main classifications to which we charge the equipment development work and these classifications are subdivided into one or more subclassifications as may be necessary for administration purposes. The main classifications are central office equipment and circuits, substation equipment, wire transmission systems, work in connection with patents, etc. With some minor modifications, the classifications above mentioned have been used for five or six years. Prior to

that we did not have classifications of that kind or of that form. We kept track of our work, of course.

Our patent department may ask us from time to time specific questions in connection with patents. That classification, however, is not a large one so far as expense is concerned. The work of our division relates only to those matters generally handled.

Referring to wire transmission systems, there is no division as to that for long lines or for local toll or anything of that sort, nor is there any division as to switchboards, and that is true throughout.

Development & Research, A. T. & T., does not publish any magazine or journal. From time to time, however, engineers of the department publish articles and those are published in proper journals and there is a journal in the Bell System in which some of these articles are published, the Bell System Technical Journal. I have made inventions that have matured in patents in one or two instances. They had to do with printing telegraphs.

[fol. 7678] Patents are handled in this way. We prepare a description of the piece of apparatus or the equipment or the system, whatever it may be, and that is transmitted to the Patent Department, A. T. & T. Mr. Folk is head of the patent department.

Some projects took some time before they matured into commercial devices manufactured by the Western Electric. Depending on the particular matter, it may take a month before a job is finally completed, or it may be several years, as, for instance, the development of the dial system. It may take all the way from a week to a couple of years from the time my division starts work on a project before it is finally turned over to the Laboratories. I don't recall any at the moment, but I presume that there are some that took more than a couple of years.

Some of the projects that are undertaken in my division fail, but they are very few. They don't get very far. An idea may disappear by the end of the day or within a week or a month. I don't recall any project turned over by my division to the Bell Laboratories that has failed.

I couldn't give any idea of the number of projects started in a year that fail, or the number that started during the same year and succeeded; nor could I give any idea of the number that are started in a year that fail to go to the Laboratories and of those that do go, I would have to go

to our records for that. Generally we keep records of all our projects, of those that fail as well as those that succeed, but we have no system of classification as to failures and successes. All of our development projects go into those general classifications that I spoke about. A project may be a very large one or it may be a very small one. Some years we may have a predominating number of relatively small projects with a few large ones. Some years all the projects might be very important, but we might have as many as 10, 20 or 30 projects during the year in my division.

The records are kept in the department's office and I think there are lists of projects classified in some way as to subject matter, but I cannot answer definitely. The records are kept by Mr. Shepard.

For development & Research of the A. T. & T., the men are recruited from the associated companies, long lines, universities and the Bell Laboratories. That has been true [fol. 7679] as far back as I can remember. I don't recall ever having transferred any men from my division to Western Electric. Some of our men go to the Bell Laboratories. I am not certain whether any go to E. R. P. I. I think we lost one man to it or Graybar several years ago.

I am called upon occasionally to examine devices or processes covered by patents that are purchased by units of the Bell System,—Western Electric. We have not done any of that work, however, for some time. Our Patent Department might ask our views as to patents in question and we would attempt as engineers to determine what value the system described in the patent would be to the Associated Companies. I have looked into the merits of patents of the Automatic Electric Company. We would examine the patents and get as good a picture as we could of the system described in the patents. We did not make any experiments. We also looked into patents of the Kellogg Switchboard & Supply Company, and we examined the merits of patents for the Western Electric coming from Herbert N. Friendly. We made an examination of the patents to determine whether the arrangements described therein would be of value to us in our work.

I think we were asked by our Patent Department for our views about certain patents of the Stromberg-Carlson Telephone Mfg. Co., and of the North Electric Company.

The Western Electric manufactured devices embodied in

patents that I examined, as above mentioned. For example, apparatus of the step by step type embraced in patents of the Automatic Electric Company relating to machine switching.

I did not attend any conferences in 1919 respecting the organization of Development & Research, A. T. & T. Work such as has been done by Development & Research, A. T. & T. since its organization was prior to that done by the Engineering Department, A. T. & T. The general plan of carrying on our development work was substantially the same as it is now.

My duties as equipment engineer prior to July, 1919, were the same as now, except that since July, 1919, I have had additional duties relating to central office and sub-station equipment. We look to the Bell Laboratories to determine that a device found to be workable can be manufactured from a practical standpoint.

[fol. 7680] Mr. H. A. Appel is connected with Development & Research, A. T. & T. in the Transmission Development Division. Mr. O. B. Blackwell is head of the division. Mr. R. Bown is in the Transmission Development Division. Mr. G. A. Campbell is Research Engineer, Development & Research, A. T. & T. J. R. Carson is Transmission & Development Engineer. E. H. Colpitts is in the Development & Research; don't know G. Cirsson or H. C. Edgerton. L. Espenschied is in the Transmission Development Division; don't know J. O. Gorgon or A. Haddock; I think Mr. A. H. Nicolson was with the Bell Laboratories at one time. H. S. Osborne is with Operating & Engineering, A. T. & T. I don't know H. S. Read. H. B. Shreeve is with Development & Research; I don't recall K. S. Van Dyke. P. I. Wold formerly was with the Bell Laboratories and later with the Patent Department, A. T. & T.

There are no publications of Development & Research, A. T. & T. However, there is a Bell Telephone Quarterly and the Bell System Technical Journal, wherein articles written by engineers in Development & Research, A. T. & T. are published.

OTTO BERNARD BLACKWELL, a witness for the defendants:

Direct examination.

By Mr. Haight.

I reside at Plandome, Long Island; I am Transmission Development Engineer, Development & Research Department, A. T. & T. and have been since the formation of that department in 1919. I attended no conferences at that time relative to the organization of that department. For a number of years prior to the organization of that department I was Transmission Engineer of the Engineering Department, A. T. & T.—from about 1914 or 1915. Before that I was just one of the engineers in the department, entering it in 1906, immediately upon graduating from Massachusetts Institute of Technology in 1906 with degree of bachelor of science in electrical engineering.

From 1906 until I became Transmission Engineer I was working on various jobs having to do with transmission. [fol. 7681] When I became Transmission Development Engineer of the Development & Research Department, A. T. & T. the work of the department I headed was divided and I only kept that part that came under Development & Research Department, the engineering work going over to Operation & Engineering Department, A. T. & T. The latter department has to do with advising the field, keeping in general touch with the field and advising them on the problems which arise in their work and on which they think they want advice. I have contact with that department as through them we get part of our information as to field conditions and needs. That department contacts us when some matter may be referred to them on which they want some advice from the development standpoint before replying.

The work of my division of the department of Development and Research covers generally transmission waves—waves and impulses which transmit communication. In the telephone field we are interested in the waves which are used in transmitting speech, starting with the formation of those waves by the talker, that is, the subscriber who is talking over the telephone circuit; in the transformation of those waves into corresponding electrical forms and as they go out over the various types of circuits and finally when they reach the receiving end, transformed into sound waves again and are listened to or observed by the listener. In

connection with other phases of communication like telegraph we are interested in the transmission of the waves and impulses which carry the communication.

That work in the telephone field has to do with existing telephone apparatus, and with proposed apparatus. Some of our work has to do with the apparatus used in the long lines department. The same is true of new or proposed new telephone apparatus. The same is true of telegraph apparatus.

I should say my work also has to do with operation as there is practically nothing done that affects the telephone business that does not have something to do with operation.

My division has to do with originating of new or proposed new apparatus. Our ideas come from other sources than our own division, such as associated companies who may feel a need in their work; from Operating & Engineering Department, A. T. & T., who may see a need for new [fol. 7682] propositions; from the laboratories whose work may have opened up possibilities which have not been seen before, and they may come from our own work. So far as I know, none comes from Western Electric. However, they may indirectly through the laboratories, but I do not have in mind any case that arose in the Western Electric as coming to us resulting in originating any work.

The men in my division are recruited largely from schools and universities and teaching staffs of schools and universities and some from Associated Companies and one or two from the laboratories. There have been cases where we thought men with the experience that they had in the operating companies would be helpful to us in working out the particular phases of the work with which they had had experience. We surely would not have chosen men that we did not think had pretty good ability—ability, knowledge and experience.

My division has been interested in telephotography—in the transmission of impulses which correspond to the picture, as these impulses are transmitted over the circuits and also as they are handled in the apparatus at the terminals. That work has been going on four years at least, so far as it has been active. There is a system of telephotography in operation at the present time that connects eight or more of the important cities of the United States, so that mes-

sages delivered at any of these can be delivered at any of the other eight cities. The long lines department operates it in this part of the country. On the Pacific Coast it is operated by the Pacific Telephone & Telegraph Company.

Everything we do comes under the fields of telephony and telegraphy. Telephotography can be considered a form of telegraphy in many ways. In telephone work we are interested in many matters which you may not have in mind as telephone, as, for example, sound recorders, that is, devices by which sounds either right at the source of the sound or sounds which may be received over telephone circuits, are in some way recorded either on mechanical medium or on film or otherwise, so that these sounds can be later produced.

In testing circuits in the laboratory particularly, it is necessary and it has been necessary in the past, to have groups of men, crews we call them, who talk over these circuits and then we have listeners who listen to these cir- [fol. 7683] cuits, and by recording various things, such as the judgment of the listeners as to loudness or recording the mistakes made by the listeners, we may judge the circuits. This has not been entirely satisfactory, because voices vary so much from time to time, so that we have in the last couple of years gone onto a system which is now in use involving what we call an artificial voice and ear proposition. Instead of a speaker it uses a phonograph record, and records can be produced entirely satisfactorily now. Of course they are always the same, so there is no variation, as is the case when we have human beings and this voice is sent out through devices which, for the purposes of talking into our instruments approximate the effect of the human mouth and we use that method in testing our circuits.

We have considered in quite a little detail and we have done quite a little work on a proposition that has arisen a number of times, which has in mind the use by subscribers of devices which record conversations, which go on over the telephone circuits they are using. That has not been used in the long lines. The only uses that I know of at the present time are in connection with certain power companies who are using it on, as I understand it, what they call their load dispatching circuits. It is my understanding that the control of the different stations supplying power is cen-

tered, for example, in some point, and if anything goes wrong, they want to be able to fix responsibility for the incorrect orders that may have been issued.

I have had nothing to do officially with electric phonographs for broadcasting stations. Some of our people make a particular point of keeping in contact with all the work that is done both inside and outside of the company, to see if there is any use that we can find for them in connection with our work or the work of the associated companies.

There are other cases of uses coming under those two categories but, so far as I can recall, the only two types of things for which we have considered these are recording in connection with telephone service and testing methods.

I have had no work to do with respect to the Victor Orthophonic Phonograph. I have had to do with television as we are interested in the transmission of the electrical impulses which correspond to the pictures as they are transmitted over the wire. Also, in connection, for example, with demon- [fol. 7684] strations such as that which was made between New York and Washington on television, it was the people in my department who were responsible for the wire arrangements that were set up between New York and Washington and for the changes that were made in the lines to fit them to transmit these rather high frequencies. We have to distinguish between when it actively began and when there were ideas which were in the department because of either originating in the department or coming to us from outside. The active work on television was in comparatively recent years. I would estimate four years.

We kept in touch with every form of communication. Personally I have read articles and have had some interest in both picture and television, which grows out of pictures in a way, ever since I was in the telephone company as far as I can remember.

I cannot say definitely as to whether our division, up to four or five years ago, did anything about television except to read articles. It is almost certain that we did do a certain amount of imagining or perhaps inventing. There may be patents that go back that far. In keeping in contact with these outside possibilities we always consider whether they have any application and it is not possible to determine whether they have some application without making some

sort of a study but I think that our studies were, so far as I remember, not particularly formal prior to that time. I am not sure about that. It may very well be that we have in our files activities going back quite a bit prior to that date.

I do not remember any experimentation with television going back more than four or five years. Television was first used two or three years ago. Of course, the Washington demonstration was a demonstration of a system that had necessarily taken a considerable while to devise and construct. I do not know how many years. That apparatus gets back into the laboratory work and what they may have had there I don't know. That came under Mr. Arnold in the laboratories. I had contact with Mr. Arnold's work in the laboratory ever since he has been in charge of the work up there.

As far as my memory goes, that work on television had not reached the stage, either down here or in the labora- [fol. 7685] tories, where it had resulted in our discussing it with Dr. Arnold formally until about the date that I mention it as being an active matter, four or five years ago.

I have no distinct memory of informal discussions with Dr. Arnold. The only work that we have done on it prior to those discussions was a general matter of keeping in contact with all communication matters. I have no remembrance of any contact with any one relating to television prior to this time four or five years ago.

As to whether there are any records, if there had been anything that resulted in any formal contact, it may have resulted in a letter. If so, that would be in our files.

In our division we have a work classification at the present time which we use and each of our people keeps a record of the amount of time he spends each day on each of those classifications. These records are by years. We do not classify them by projects. In times past we had work orders somewhat similar to the laboratory work orders. That was changed about five or six years ago. I don't know how long that system existed prior to five or six years ago. Such records as I have made are still in existence, so far as I know. Mr. Shepard or his department has them.

My division has done work upon radio, two types of work. Certain work has had to do with the stations themselves in so far as radio has led to stations; certain work

has had to do with the question of starting the various radio cases, the originating of the cases, the authorizing of the cases which are similar, of course, to what we do in connection with other matters.

Undoubtedly our people have developed inventions concerning radio. I think an invention was made by one of our people on what we call the single side band system of radio transmission.

I believe there have been antenna inventions which our people have made.

Mr. H. A. Apfel is in my division. He has made a good many inventions, but I don't know of any inventions he made relating to radio.

I am a joint inventor of a system for controlling carrier or a standard frequency.

I know Mr. R. Bown. He is connected with my division. I don't know of any inventions that he made. He has been [fol. 7686] working on radios many years, but I don't have in mind the invention. I don't think any research work was done on his inventions. My invention or joint invention was limited to a radio wave—a standard radio wave which was received by radio stations, used as a basis. There has been work done on stabilizing radio stations by transmitted waves. I believe, however, that that comes under other inventions. It would be a patent matter as to whether my particular invention or some others bore on the particular systems. There has been work, however, on stabilizing radio channels by transmitted waves, transmitted standard frequency.

I don't remember who the other joint inventor of my invention was. He was in my division. I think the invention was made seven or eight years ago, I am not sure about that.

I know G. A. Campbell who made the filter invention and antennae array invention. On filters there has been a good deal of experimental work done. We did not do the experimental work on filters other than in the sense that when the development involving them gets out into the field, we take a part in the practical tryout, but I think what you have in mind is the laboratory function.

J. R. Carson is in my division in charge of a small group who do theoretical work largely, mostly mathematical; he has made the invention relating to radio—single side band

method of transmission. I think he did some work on selective circuits, but I have no definite remembrance of any other invention of his.

There are about 125 men in my division. We have hired no men in the last year or two. I think we have lost one or two, perhaps three. I cannot definitely state whether the number has been larger than at the present time, perhaps one or two.

Mr. Colpitts is in general charge of Development & Research Department, A. T. & T. under Mr. Jewett. He has made inventions relating to radio but there was no research work in my division respecting those inventions. His invention was a modulating circuit and the research work was done in the laboratories regarding that. That is the only invention of his I recall.

Mr. Espenschied is in my division and he has made a good many inventions. I don't recall any at the present time. I [fol. 7687] would have to refresh my memory as to what development work was done respecting his inventions.

When inventions are made in my division I frequently have something to do with transmitting information respecting them to the Patent Department. However, they don't always come through me, they might go directly to the Patent Department, but they usually come to me for transmission in the form of a memorandum stating what the idea is. I do not personally keep copies of those memorandums but they are kept in the files of the general department, not of my division.

We have no records at the present time which I would say was a project record. Each case that is sent to the laboratories and authorized to go forward is covered by a letter and a copy of that letter is in our general files and then we have reports which our people make from time to time of the work that they are doing in different classifications; also, many of those go into the general files but we have not a case classification, a project classification such as laboratories have.

We have records of everything of any size that go to the laboratories from my division. Projects or work performed in my division that do not go to the laboratories generally leads to bulletins for the field, and we have lists of such bulletins.

Our fellows have ideas that are turned down before they reach the stage of being sent to the laboratories. Some of our patents cover matters that have not resulted in practical apparatus, but there is no attempt to keep a record of dead ideas. There is no record or list of all the projects that have been worked on in my division. The only list we have is this work classification which goes down in some of the divisions to fairly small matters, but below that point we do not go into individual projects. When we had some of these work orders, I don't know whether they were listed; I assume they were. All records are kept by Mr. Shepard.

Our expenses are budgeted somewhat prior to the beginning of each year. Our work is not budgeted. The work classification is the basis for that budget. The budget includes a number of factors. The first and the chief factor, of course, covers the men's time and on that Mr. Shepard sends to us sheets on which he asks us to put down for [fol. 7688] these various classifications the expenditures we would expect under those classifications for the following year. He also asks for any estimates that we can make as to billings in connection with experimental work, but the big item is the men's time.

I don't know that I said anything about sound pictures. We have done no work on sound pictures. I am talking about my department now. Of course some use has been made of sound pictures by our publicity people, but there has nothing been done in my department on sound pictures whatsoever.

My division had to do with the development of some of the principles upon which sound pictures are made. Loud speakers are an important part of sound pictures and loud speakers have been a matter in which we have been interested. Our work on loud speakers in my division has been with respect to their application in the telephone service. In connection with loud speakers we had the same responsibilities that we had in connection with other matters in attempting to see what use they had in the Bell System and in the authorization of certain work by the laboratories on them. Our department has been interested in various demonstrations in which we have been responsible for the loud speaker phases of the demonstrations.

My contact with sound pictures has been largely in con-

nection with hearing demonstrations of sound pictures and there have been loud speakers used in all those demonstrations, so far as I can recall, that I have ever listened to. I had nothing whatever to do with the principles on which the Victor Orthophonic phonograph is based. The Orthophonic Victrola has nothing to do with telephony. I don't have in mind any work which we authorized which bore on the phonograph proposition which led into that orthophonic victrola.

I do not doubt that I employ the word "principles" frequently, but it is not a word that has any narrow meaning or any specific meaning. What we mean by it is generally shown by the context of the statement in which we use it.

As to whether there is any principle in any sense that I might employ the word used in telephony, I might say that electro magnetism was a principle used in telephony. It is employed in telegraphy, in radio, and in certain types [fol. 7689] of phonographs which we worked upon, that the laboratories have worked on at our request.

The phonograph itself was a mechanical phonograph in which certain refinements had been made in connection with the reproducing apparatus. I do not know what you can put your finger on and say that was the principle of it.

Neither the A. T. & T. nor any of its departments supplied anything to the Victor Orthophonic Phonograph directly. The recording used electro-magnetic waves and there may have been some indirect contribution from the fact that we use transmitted speech in telephony and this recording used transmission of speech. I don't know whether the Victor Company has any arrangement with A. T. & T. or any subsidiary of it.

There is nothing in my division that we know of as by-products. I have heard the word by-products used in connection with some of the devices that are sold by the Electrical Research Products Corporation. Our only contact with them is that we make it a rule—some of our people make it a rule to keep in contact with every new device of that kind that is put out in order to determine whether there is anything there that might find a use in our work or in the Associated Companies' work. That is the only contact we have with the by-products. So far, however, as recording apparatus and loud speakers and some of these other matters you have mentioned, as I recall them, having a field of

application in the Bell System, we are very much interested in them.

As to which one of the by-products I have had anything to do with in a[illegible]wise, you have indicated the phonograph. I should say they are not by-products in so far as we are interested in them, but we are interested in voice recording loud speakers or pick-up transmitters or transmitters in general. Those are the three things I have in mind.

As to any other by-products with which I have had to do, I would mention deaf sets to help subscribers who may be hard of hearing. Of course in voice recording I include voice recording and voice reproduction.

I only know what E. R. P. I. puts out by the fact that I see some of their products. Its largest production is on motion picture talking devices and sells phonograph devices [fol. 7690] of various kinds for certain purposes. I have come in contact with its deaf set apparatus. That is all I recall now. The talking moving picture apparatus was worked upon in the laboratories or at that time the Engineering Department of Western Electric. My division contributed nothing to that direct. If there has been any contribution it has been through the fact that we have contributed to the general telephone art. We have contributed to the general matter of better quality service, better quality telephone service and to what extent the laboratories may have drawn on anything that we may have contributed I haven't any information. We have been responsible for inaugurating certain work and I think undoubtedly some of our people have contributed definite features on amplifying devices.

In the application of amplifiers to a telephone plant there are many circuit arrangements and adjustments that have to be made. Our people have contributed a good deal in connection with those matters. For example, the matter of balancing lines which is an integral part of every repeater, I guess practically every repeater we have. Our people I know have contributed a number of inventions in connection with filters, electrical filters which are playing an important part in our telephone service in connection with carrier, radio, and such matters.

I do not have in mind any single instance where any invention arising in my department was used or embodied in any of the by-products.

The contribution of amplifying devices to talking motion pictures was of considerable importance. As I understand the talking motion picture, the recording as it is taken off of the film is amplified considerably before it is used to actuate the speaking devices.

My division had to do with repeaters. We have had to do, first, with the originating of many of the cases, many of the developments that have been carried out and we have had to do a good deal with the application of these repeaters in the plant. We have had to do with the writing of bulletins to furnish information so that the Associated Companies could use these repeaters to the best advantage in their plants.

The particular case of developing a hearing aid for telephone users, the general case was handled by the equipment [fol. 7691] people, but we acted as consultants with them and with the laboratories on the amplifying device that is used in connection with it. The stethoscope was not one of the hearing aids, nor were audiophones.

My division has had to do with testing apparatus for submarine cables. There has been work giving a great deal of attention in the last few years to a telephone cable to Europe to permit a telephone circuit all wire from the United States to Europe. In connection with that work there have been tests carried out of various features, such as noise, for example, on experimental cables. There have been tests carried out in the laboratories on artificial cables. We have been, of course, interested in all of those.

My people have not had any large part to do with the particular testing apparatus used, although they may have suggested some features of it and then kept in general contact with it. My people have used such testing apparatus on the cable from the United States to Cuba. Other tests I have in mind were almost completely made by laboratory men.

There are a good many things which the Bell Telephone Laboratories or the Western Electric has developed in the telephone field as a result of work in my division. By telephone field I mean the business of the Associated Companies.

Most of the work that I have connection with is too complicated to permit you to put your finger on one part of it and say that that is the thing that led to a certain result. In every case there are a lot of contributors to this thing, and

furthermore, these various contributions are so many that they become submerged, in general, in our consideration of a thing, and we do not think of these things as being John Smith's thing or somebody else's thing. But my department has contributed undoubtedly, surely, to every big job which the department has had contact with. For example, long cable circuits, including what we call four-wire cable circuits, application of repeaters to open wire plant, carrier telephony and telegraphy, in both open wires and cables, sub-station apparatus, program transmission over telephone circuits. In each of these cases, you will understand I am not mentioning them because in all I have in mind a [fol. 7692] specific element contributed by a particular man in my department, but because they are all the big matters on which they have been actively employed. I think we can go ahead with the list.

Radio, telegraph, echo suppressors, automatic gain control devices, telephone and telegraph testing apparatus. These include, of course, repeaters that we have mentioned as parts of them. I think that covers the thing broadly. Of course we could break such matters as long cable systems down to parts and enumerate some of these parts.

I would also include telephotography. Television, however, is not in commercial use; also I would include voice recorders, but I think our people have contributed some thoughts to that. As to whether I would include talking pictures, I would say that is much less likely as our inventions are more likely to come from the question of the application.

In the voice recorder I should imagine our suggestions or our inventions would come in the applications which have been considered rather than in the physical recording or physical reproducing itself and it seems to me unlikely that any suggestion that has come from our people has gotten through in the talking motion pictures.

The thing I definitely have in mind with respect to amplifiers are the application devices which fits them into the telephone system, that is, the artificial line arrangements and the filtering arrangements. Stripped of these application devices, that is, the pure amplifier, as such, is almost wholly a laboratory proposition. Now it may very well be that some of our people have made suggestions that have helped in connection with such amplifiers, but the ampli-

fying device itself is pretty largely, almost wholly, so far as I now definitely have in mind, a laboratory development.

We have used what I assume you call public address systems in various ways, and it may be that some of our people have made suggestions in connection with that. I have not in mind at the present time anything that definitely is incorporated as a feature in public address systems.

As to the records in my department of work done, we have not gone below the classification. Radio, of course, is a main classification, but under "radio" you will find subclassifications, such, for example, as "ship-to-shore" and "trans-Atlantic" and a number of classifications of that kind. [fol. 7693] Below that, however, we do not go with a definite routine. The individual job, as I understand it, would be covered by correspondence. There is always a definite organization letter for that to the laboratories. There is no formal list of cases below these divisions that I use.

Mr. Blackman: There is a sheet made up every month and summarized every year of the expenditures of the Department of Development and Research, which divides the work into 19 main divisions and each of those divisions is divided into two or three subdivisions, which will give you the work broken down into more than a hundred different classes. For instance, take "radio," there are probably, as I recollect it, ten or a dozen divisions of radio, as Mr. Blackwell stated, such as "ship-to-shore," and this, that and the other thing, under radio. Now, I have some of those sheets and I have had one or two of them enlarged, because they are made very fine and are hard to read. If you would like those sheets, I would be glad to let you see them.

We have given to Mr. Wray some books that contain lists of projects, I think they are by number.

Mr. Blackman: You can have anything that does not disclose certain matters that we are working on at the present time. Of course, Mr. Haight, as a patent attorney, will understand that matters that we have in mind at the present time, we do not desire to announce to the world, what we are working on.

Mr. Haight: And we do not wish to pry into those matters at all.

Mr. Blackman. We will be glad to give you a list of all the projects except those, and any book that contains no project

of that kind, we will give to you, and if a book contains a project of that kind we will take it out and indicate that we have taken out the project, because it was of that character.

Mr. Goldstein: Will those that you take out cover all the activities of Electrical Research Products?

Mr. Blackman: I don't know what they are working on.

(Discussion off the record.)

Mr. Blackman: Where we have a number of dollars (I heard you mention that to Mr. Haight), where we have a number of dollars spent each year, we break that down into some subdivision.

[fol. 7694] Mr. Goldstein: The number of dollars you spent in each department, have you got those covered in those projects?

Mr. Blackman: Not for Mr. Blackwell's department, but we have it for the whole D. & R. Department.

The Witness: There is no separate budget for my division, and I am surprised if Mr. Morehouse testified that he had. There is no budget by divisions in my department. In making up the departmental budget, we furnish Mr. Shepard an estimate of how much money we think we shall want to spend in each of the classifications and it goes down to sub-classifications,—in each of those sub-classifications, we advise how much we shall want to spend, but we don't go below those classifications.

Dr. Frank B. Jewett, for the defendants:

Direct examination.

By Mr. Haight:

I reside at Shore Hills, New Jersey. I am vice-president of the A. T. & T. and president of Bell Telephone Laboratories, Inc.

I was graduated in 1898 from Throop Polytechnic Institute of Pasadena, now the California Institute of Technology, with the degree of Bachelor of Arts in Electrical Engineering. I received the degree of Doctor of Philosophy from the University of Chicago, in physics, in 1902, and was research assistant under Prof. A. A. Michelson; that was in 1901 and 1902.

I was instructor in physics and electrical engineering in

the Massachusetts Institute of Technology from 1902 to 1904.

I entered the employ of the Engineering Department of the A. T. & T. in fall of 1904, but a year or so subsequent to entering that employ I became transmission and protection engineer of A. T. & T., which position I held until spring of 1912, when I became assistant chief engineer of Western Electric; I became chief engineer of Western Electric in 1916; its operating vice-president in 1922 and in 1925 I was transferred to my present position.

The Development & Research Department of the A. T. & [fol. 7695] T. was organized about middle of 1919, but I am not very clear on that because I was not with the A. T. & T. at that time.

From 1907 on, all the laboratory work of development and research for the Bell System was carried on in the Western Electric in its Engineering Department and that was substantially of the same nature as those which are now carried on by Bell Telephone Laboratories, which is merely an outgrowth of the Engineering Department of Western Electric.

The Western Electric carried on in its engineering department all of the physical development on the problems which were presented to it by the Engineering Department, A. T. & T. and in addition it carried on, on its own behalf, such problems—the research and development of such problems as had to do with articles of its own manufacture, in which the American T. & T. and the associate companies were possibly only indirectly interested. By that I mean research and development to cheapen the cost of apparatus which was then standard, which kind of work could be undertaken by a manufacturing department without reference to its customers, provided it did not change the character of the apparatus to be furnished. It undertook fundamental research work at the instance, largely, of the American Company looking to the development of new, fundamental information which was applicable in the telephone business. It undertook the development of new central office and substation apparatus and equipment and the circuits which were used in the telephone and telegraph business and it investigated materials which were employed in the construction of that kind of apparatus. It investigated such things as cable structures, telephone cable structures, in fact, it undertook research and development work on the physical side in

everything which pertained to the communication business.

That would include such subjects as transmission equipment in so far as it related to physical things as distinguished from the operational types of investigations which had to do with the use of things. Western Electric during those years substantially did not do any work of the characted done now by the Development & Research Department, A. T. & T. From 1907 on, work of that type has always been done in either the Department of Development [fol. 7696] & Research or in its predecessor, the Engineering Department, A. T. & T.

Prior to 1907 the set-up in the Bell System was somewhat different. The American Company had laboratories of its own in Boston and the Western Electric Company, the manufacturing part of the Bell System, had laboratories both in New York and in Chicago, and in those laboratories it conducted somewhat in parallel some of the work or work of a similar character to that which was done in Boston, but in 1907, at the time the Engineering Department of the American Company was removed from Boston to New York, the whole scheme of research and development work in the Bell System was reorganized and all of the physical or laboratory work was concentrated in a single laboratory in the Western Electric's Engineering Department in New York and all of that part of the work which related to contact with the associate companies on the development of new things or in the study of fundamentals from a theoretical standpoint was concentrated in the Engineering Department, A. T. & T.

It would not be exactly true to say that the Engineering Department, A. T. & T. took over in 1907 the Development & Research functions theretofore performed by Western Electric.

It retained all of the functions which it had had for many years prior to that, but did take over that part of a similar work which had been done in the earlier days in the Western Electric.

In the very early days the associate companies were in direct contact, with regard to new things, with the Western Electric as well as with the American Company with the result that there was a certain amount of development work on physical apparatus which was carried on by the Western Electric as a result of its direct contact with the associate companies without much reference to the American Com-

pany, but about 1907 it had become evident that the best interests of all the associate companies would be served by concentrating the consideration of new things so as best to serve all of the interests, including the Western Electric, which by that time had gotten into the position where it was manufacturing a wide variety of things almost identical, but not quite, because of the different way in which the [fol. 7697] requirements had come up to it.

A large part of the problems going to the Western Electric then came to it from the Engineering Department, A. T. & T. That goes far back of the time when I first came into the business, but I should imagine from the early times a large part of it went directly to it from the A. T. & T. Prior to 1919 the A. T. & T.'s problems from long lines and from Bell subsidiaries went to Western Electric for solution through the Engineering Department, A. T. & T.

I might qualify that to this extent, that with regard to specific orders for equipment, if there were minor problems involving variations from standard equipment, those might appear first in the Western Electric because they were the recipients of the orders, but the solution of those problems even at the time you are mentioning involved consideration by the Engineering Department, A. T. & T.

The Bell Laboratories, Inc., was organized at the beginning of the year 1925. Broadly, it carries on all of the work which prior to January 1, 1925, was carried on by the Engineering Department of Western Electric, and it conducts the Research and Engineering work for the Bell System as a whole, including the A. T. & T. and the Western Electric.

The Department of Development & Research, A. T. & T. is charged with the responsibility, the primary responsibility for the Bell System for providing new and improved things or methods for the Bell System. In carrying out that work it is charged with the responsibility of studying the needs of the associate companies as those needs develop through their growth and the growth of their business. It is charged with the responsibility of keeping in touch with the progress of science and engineering generally, not only in the Bell System, but throughout the world, and where physical things are required, of formulating the requirements to be submitted to the Bell Telephone Laboratories for solution in the laboratories. The Department of Development and Research maintains no laboratories. It is

charged further with the responsibility of keeping in touch with the development work as it goes on in the laboratories and at the conclusion of a development project, specifying whatever service tests may be required and finally of approving of the thing which has been developed, to meet the requirements that have been set up, and when it has ap- [fol. 7698] proved those things, of doing the necessary acts to make them standard in the Bell System and of furnishing to the associate companies, through the Department of Operation and Engineering, all necessary information which will permit the associate companies and the Long Lines to order this equipment and to operate it when it has been installed.

The new and improved things that I mentioned include new and improved things for all parts of the Bell System. The new and improved things that are finally approved, if they involve physical things, find their way into the Western Electric either for manufacture or for supply. Some of the things involve physical things which the Western Electric does not itself manufacture, but which it does supply to the associate companies on order. An example of that is power machinery. The Western Electric does not manufacture power machinery, but it does supply power machinery to the operating units of the Bell System.

Development & Research Department, A. T. & T. has nothing whatever to do with originating ideas in relation to so-called by-products. The ideas that are developed by Development & Research Department, A. T. & T. come from the world of science and engineering generally. They come from common knowledge which is derived from publication of scientific work or the less common knowledge which comes through the contact which we maintain with operating communication units throughout the world or with scientific laboratories throughout the world. They come from the needs of the operating units of the Bell System as the need for new things develope and we learn of them either through our direct contacts with the operating units or more generally through the Department of Operation & Engineering, which is in very intimate contact with the associate companies. They come also from the general knowledge of the telephone business which the members of the Department of Development & Research, who are acquainted with all phases of the physical side of these things; they come also from the new knowledge which is developed

through the physical research work in the Bell Telephone Laboratories itself, which new knowledge very frequently suggests new applications or new methods of applying knowledge to old things. I think those, in general, are the [fol. 7699] main sources of the problems as they develop in the Development & Research.

For the most part the men in Development & Research Department, A. T. & T. are, and probably to a larger extent than in almost any other department of the system, college or technical school graduates. They are trained scientists or engineers. Some of them come direct from selection from graduates, from the great universities and technical schools, who have entered the department immediately on graduation either with their baccalaureate degree or their advanced degrees. Some of them have come from the other departments of the business. The operating companies—operating units and I think in some cases a few have come from the laboratories. In all cases, however, they are men who are selected because of special qualifications for the kind of work which has to be done here.

In general, except for the men who come directly out of college, they are men who have had training and experience in some particular line.

I doubt if there is any single place where you could say that you could get the most information of the development work of the Bell System over the past. The system is too vast, and the kind of things are too diverse to be assembled in a single repository. You must realize that you are dealing with an organization involving hundreds of thousands of people engaged in all kinds of problems. So far as the physical needs are concerned, knowledge relating to the underlying principles and to the structure of those things I presume you could find most of them in the Department of Development & Research and the Bell Laboratories. When you come to operational methods and things having to do with the daily conduct of the business, I presume that the Department of Operation & Engineering, A. T. & T. would be as good a repository as you could find. When you come to matters of detail of constructing the physical things, it would be the Western Electric. But there is no central repository in which we attempt to concentrate the essence of our knowledge of this business.

In general, E. R. P. I. handles the kind of things which you referred to as by-products, the things which are not di-

rectly a part of the operational functions of the Bell System [fol. 7700] as a communication company, such things as talking motion pictures and odds and ends of physical equipment which have a use both in and out of the communication business, and I think they handle also the relations with organizations in and out of the United States, on certain things in the communication field, such as submarine telegraph cables. That is not quite a by-product in the sense that I first defined it—it is in the communication field, but it relates to business which is not particularly of the United States.

E. R. P. I. handles also phonograph recording apparatus in so far as it relates to the use of that type of equipment outside the Bell System. I think Graybar handles public address systems. That is really communication apparatus, the kind which is used largely by the associated companies, but it has a use outside of the operation companies.

I don't know about the details of E. R. P. I.'s handling electrical phonographs for theaters or for broadcasting stations. E. R. P. I. also handles picture transmission apparatus at different times in so far as it is related to sound pictures. I think they handle nothing connected with straight motion pictures.

E. R. P. I. also handles cathode ray oscillographs, which is a measuring tool, and it has some utility wherever it is desirable to examine the character of alternating current circuits, college and university laboratories and other electrical laboratories. It may be handled, however, by Graybar, but it is a by-product type of thing which may be handled by E. R. P. I.

Telephotography is used wholly within the Bell System and it is of relatively small use.

Television is not a practical thing. It is still very much in the development stage.

I do not think E. R. P. I. handles radio. I think that is done through Graybar. Graybar handles the vending of communication apparatus in a non-Bell field. For instance, telephone cable as used by railroads is handled through Graybar. Deaf set apparatus is handled through Graybar. The small amount of interest which we have in radio through broadcast transmitting sets we have handled through Graybar, and I think the public address sales are through Graybar.

[fol. 7701] I know of no by-products, things which have

come out of our general work in the broad field of communication but which are not of a communication nature, which are handled through Graybar.

The Department of Development & Research has been interested in the development of vacuum tubes and their applications, in the sense that vacuum tubes are a very powerful and valuable tool in the communication business, but as I have indicated before, the Department of Development & Research, having no laboratories, its interest in the development of vacuum tubes and the things in which vacuum tubes can be used is not in a position, nor does it do physical work looking to the development of those things. But many of these by-products which we have been referring to, do involve vacuum tubes, and in the sense that the Department of Development & Research has had an interest in the proper development of vacuum tubes, to that extent you might say they are involved in the by-products.

The vacuum tube because it is inherently based on physical principles which make possible enormous amplification without distortion, is at the heart of all amplifying devices, and distortionless amplifying devices have made possible loud speaking telephones such as are used in public address systems, and more recently in talking motion pictures.

Talking motion pictures, as a matter of fact, in the sense that we now know them, were an impossibility until a satisfactory loud speaking telephone came into the picture. Most people I think have an idea that the problem was a problem of synchronization of sight and sound. Actually the problem was primarily a problem of the loud speaking telephone to get a sound which was comparable with the sight which one got through one's eyes. In the very early days of experimentation, years and years ago, on so-called talking motion pictures, you might have a life-sized picture but a miniature voice, so that it would fail to give the sense of reality which is required for successful talking motion pictures. Now, the success, whatever success there is in the present talking motion pictures, in the last analysis, goes back to the character of the amplifying device and the loud speaking telephone and also to the character of the record [fol. 7702] which starts the energy through the train.

The idea of the telephone repeater as a useful tool in the telephone art is almost as old as the telephone itself. It involved the idea of revivifying weakened current from a

local source of energy and doing it without distorting the thing which you amplified. Until the vacuum tube appeared in the field of our scientific knowledge as a distortionless instrument, all of the attempts to make telephone repeaters were confronted with the difficulty of this distortion characteristic. All of the early attempts, and they were in some cases fairly successful, because of the extreme ingenuity of the men who worked on them, involved essentially the principle of an ordinary telephone receiver actuating what was, in effect, an ordinary telephone transmitter, which was supplied by local energy, but the best of those instruments all introduced a considerable amount of distortion, so that while you could amplify the energy on the far side of the telephone repeater, the character of the current, of this amplified current, was not a mirrored image of the thing which was put in at the initiating side.

When the present thing which we call the vacuum tubes came in the pictures, as a result of scientific research the picture changed, because there was given into our hands the embryo of a device, which could produce as much energy as we wished to employ without substantially affecting the character of the currents which we put in to control it and consequently it became possible to begin real constructive work on the development of telephone repeaters, which would do one of two things. Either they would very greatly extend the range of circuits of an existing character by revivifying energy as it became too small to be usefully employed or, conversely, they provided us with the means of reaching between two more or less distant points with smaller and cheaper types of physical connecting circuits. Now, that same characteristic which was so valuable in the telephone repeater art and which has made possible such a wide extension of local and long distance telephony is identically the principle which is required in much of what is known as radio transmission, both at the transmitting station and at the receiving station. At the transmitting station this ability to amplify without distortion, and another characteristic which the vacuum tube has of permitting you [fol. 7703] to mix things together, to modulate one kind of current by another kind of current, finds its use in taking very weak currents and raising them to the enormous powers which are required at the sending station; at the receiving station, as we all know from the radio sets we have in our houses which enables us to take infinitesimal small

amounts of energy and control considerable sources of local energy whether from batteries or electric light circuits and produce through the loud speaking telephone a sound which can be heard by one or many people and which is substantially the same sound which was spoken into the transmitter at the distant transmitting station.

Telephone and long distance lines are used in broadcasting in two general ways—they are used in what are known as pick-up circuits, namely, the circuits which connect the place of origin of the thing to be broadcast with the transmitting station—a banquet in some hotel is to be broadcast, the sound of the speaker's voice is picked up by a special high quality microphone and, if necessary, is amplified to whatever level you want at that point, and is then transmitted over telephone wires to the central studio of the broadcast station, where it is amplified—if it is a broadcast station, it is amplified to the desired degree and put out into space through the antenna. Every pick-up which is distant from the broadcasting studio itself is conducted over wires of the telephone plant.

The telephone plant is used also to connect the studio if it is remote from the transmitting antenna itself, with the transmitting plant. Then in addition to that, modern broadcasting, which we all know, involves frequently chains of stations, broadcasting stations on the same or different wave lengths scattered over the length and breadth of the land and telephone circuits are used to connect all of the transmitting stations into a common distributing point.

The Western Electric manufactures equipment used in connection with radio which is used in the Bell System for transmitting or receiving telephonic speech by radio. It also manufactures and sells the transmitting equipment for broadcasting stations. One other thing, it manufactures and sells to the United States Government and to the other departments of political government, radio equipment. It [fol. 7704] does not manufacture radio broadcast receiving sets for the home.

So far as the Bell System is concerned, the Western Electric sells direct just as it does any other kind of equipment. Broadcasting transmitting equipment is sold through Graybar.

The sale of this type of equipment—communication equip-

ment through Graybar, is the natural outgrowth inherent in the history of the Graybar Company itself, the Graybar Company having been originally the non-associate part of the Western Electric. Originally these things, before Graybar was formed, were sold by the non-associate part of the Western Electric Company.

Western Electric sells none abroad and I do not think it manufactures for sale abroad. It is barely possible that the International Standards Company may occasionally order something from the Western Electric, but the Western does not sell abroad in the sense of dealing with the ultimate consumer. Certain of the equipment which has been used at the distant terminals of telephone circuits, which radiate from the Bell System in the United States, has been manufactured by the Western Electric.

New apparatus or improvements in apparatus or inventions or processes contributed by Development & Research since the beginning of 1923 include many of the things that have gone into the more recent developments of new central office equipment or the bettering of the older art.

The same applies to sub-station equipment, for example, such things as the hand set which has come into quite common use in that period. The development of all forms of repeaters for both voice frequency circuits and carrier current telephone and telegraph circuits. Equipment in the field of telegraphy, particularly in connection with the machines, the printing machines which are used on telegraph circuits, the switchboards which are involved in the newer forms of the switching telegraph circuits. Types of telephone cable, either to provide larger numbers of circuits within a given sheath diameter or circuits of a special character; devices to ameliorate the objectionable effects of interference of one sort or another; radio equipment in so far as it is designed to improve the possibilities of utilizing [fol. 7705] radio, such things as electrical filter devices which were needed to give improved transmission through apparatus or other circuits. There are probably a lot of other things that I do not happen to remember.

The two groups, the Department of Development & Research, A. T. & T. report to me as the vice-president of the A. T. & T. The Bell Telephone Laboratories report to me as its president. They are essentially part and parcel of a single organization in which there are no overlapping functions but co-ordinated functions. Primarily, the work

of Development & Research is to formulate the problem which has to be solved physically in so far as it relates to the business of the Bell System. In doing that it studies every condition that it can find which has a bearing on the formulation of those requirements. If the problem is one that arises out of the developing needs of the associated companies, it seeks its basic information very largely in the requirements which give rise to that need. It may be that the problem—it may be a specific case arises from a stated need in some one associate company. Two things are done either directly by the Department of Development & Research or indirectly through the Department of Operation and Engineering, first the specific need at the point of origin is studied, and second, the whole field of the Bell System is surveyed to determine whether similar needs, possibly not identical, exist throughout the system, all with a view to having whatever is done as generally applicable as possible. In addition to determining through its own knowledge, the knowledge of its people and through contact with other departments of A. T. & T., its preliminary consultation with the laboratory people and, if need be, with the Western Electric, to the extent that contact is through the laboratories, attempts to find out by their studying the requirements whether there are physical limitations to the probable accomplishment of its desires. Having formulated finally the problem to be solved and having satisfied itself that the problem is one which can be solved and which should be solved, it then states the requirements for physical things to the laboratories in what you might call a form of a specification. The laboratories then takes it—it becomes the sailing directions for the laboratories' organization which has the physical plant, to carry on the experi- [fol. 7706] ments, and they proceed from that point to develop the physical things which meet the requirements of the user and in carrying out their part of the job, the laboratories make use of all the machinery which is at their disposal including their ability to contact with the Department of Development & Research and their ability to contact with the Western Electric which, if it is a physical thing, will ultimately have to be manufactured by them, to the end that when they get through with their part of the job, the answer will meet two conditions, first it will meet the condition of service as outlined through the Department of

Development & Research and, second, that it will meet the condition of being susceptible of manufacture.

The expenses of operating in the Bell Telephone Laboratories, Inc., are charged in general to cases which are taken out to cover specific things which are undertaken. The expenses of operating the laboratories are paid by its three customers; they are the A. T. & T., Western Electric or E. R. P. I.

By specific authorization generally in advance of the undertaking of the work from the party to whom the ultimate bill is to be rendered, it is determined which of the three should pay. The laboratory is run at no profit and at no loss. The expense which is incurred by the laboratories is made up of these parts: The actual salaries or wages of the employes, the cost of material which is used or equipment which is purchased and which is specifically allocable to definite cases is charged to those cases. The general expenses of administration and the corporate expenses are covered by loadings which are applied to the direct expenses which are allocable to the work which is done, so that at the end of the year the total out of pocket expense of the laboratories from every cause is covered through the billings to one or the other of those three people.

There are really three kinds of loadings which appear in the making of the cost. One is a departmental loading which takes care of the salaries and expenses of administration within the division of the laboratory itself which cannot be very well allocated specifically to jobs. Then there is the commercial loading which is the cost of general administration within the laboratories, the charge for the cost of [fol. 7707] the plant which is employed, stenographic services, heat, light, water and what not that are common facilities that are provided to everybody and finally there are the corporate—what you might call the corporate loadings, taxes, etc., those general expenses which are a part of the whole thing. Those things are apportioned to the different departments and through the departmental loadings become loadings on the individual kinds of work as far as possible, in proportion to the values or to the benefits of each kind of work in participation in the whole.

What I had in mind when I made that statement was this: In the Bell Telephone Laboratories we have a group which is essentially a manufacturing group. All the vacuum tubes which are used in any part of the Bell System organiza-

tion are manufactured in the laboratories. That is because being very new and as yet a somewhat unknown kind of thing, that type of manufacture has to be carried on very closely in contact with the research people, but in figuring the cost of jobs in what we call our tube shop, the loadings there are not the loadings of the group which is working as research people on vacuum tubes. It is a lower—when the plant is running at full capacity it is a lower loading in so far as general administration is concerned. In times like this, when that particular manufacturing operation is at a relatively low ebb, this departmental loading, which results from a large amount of equipment which is devoted wholly and solely to that, may be somewhat high, higher than it was a couple of years ago, but that function is performed as nearly as we can in an organization like ours as though it were a manufacturing rather than a research and development organization.

Any vacuum tubes that are used in connection with the business of E. R. P. I. are manufactured in this same tube shop. All of the tubes which are employed by any part or portion of our business are manufactured in that place and that place only. The vacuum tubes which may be used by E. R. P. I. are manufactured on order from Western Electric.

The loadings are apportioned, as best we can, over the activities of the laboratories for the character of the work which they do. In so far as there is variation—as there may be variations in the loadings of this department as [fol. 7708] compared with that department, then that portion will be reflected in the billings to the customer. Take an extreme and absurd example of two departments where for some reason the loadings are somewhat different, and assuming that all of the work of one department is for one customer and all the work of the other department is for another customer, then the loadings would be different as between the customers, but if the work is distributed roughly over the entire group, then each customer gets its share of the loadings in proportion to the amount of work which it has done.

Bell Telephone Laboratories, Inc., have a Patent Department which procures patents for Bell Telephone Laboratories and for other organizations in so far as by matter of request of the Patent Department, A. T. & T. or Western Electric, by patent searches or preparation for inter-

ference cases, or things of that kind. In general, however, it is maintained wholly and solely as an integral part of Bell Telephone Laboratories organization to do these things: To secure patent protection for the new things which arise out of our research and development work, to make the necessary searches to enable us to advise the A. T. & T. and Western or E. R. P. I. that the thing which has been specified for use is free of probable patent infringement. It is operated just as any other department of the Bell Laboratories is operated as an integral part of the machinery of research and development.

If in the inception of the idea there is invention of a patentable character, the patent goes to the man in the Development & Research Department who conceived the idea. If, however, the inception of this thing, which is ultimately going to result in a patent, is a broad inception, of a kind such as I may make, but the invention occurs through the process of carrying out that idea, then the patent goes to whoever it was that made that patentable invention. In other words, we do what the law requires us to do, we try to find who was the inventor of the thing which is patentable.

When the inventor is one in the Department of Development & Research, A. T. & T. in general it is handled in the Patent Department, A. T. & T. It may be handled on request of Mr. Folk's department by the Patent Department of the Laboratories if they are in a better position to go [fol. 7709] through the machinery, for example.

The Patent Department of the Laboratories is by far the largest patent group which we have in the Bell System and in some branches of our activities notably in the central office, the switching type of thing, they are far better equipped to handle the matter of preparing specifications and carrying the patents through the Patent Office than is the Department, we will say, in the A. T. & T. It may be that in some cases of an invention made in the Department of Development & Research relating to that field, to actual mechanical work, the legal work which is required to carry that through the Patent Office is turned over to the Patent Department of the Laboratories. Conversely, if an invention is made by some one in the laboratories in a field where Mr. Folk's department is better equipped to handle it, the matter is turned over to Mr. Folk's people.

In the case of work that is done in the A. T. & T. Patent

Department no billing is made to anybody. In the case of Laboratories Patent Department, since all of our expenses have to be billed somewhere, the actual cost of taking out patents as distinguished from the work which the Patent Department does in consultation with people during the progress of work, the actual cost of patents, taking out patents follows the patent. Ultimately the patents are assigned out of the Bell Laboratories. The Laboratories is not a patent holding or a patent operating organization. A patent taken out on work which is done in the Laboratories is merely a part of the work of development and research and ultimately assigned to either the A. T. & T. or Western Electric and as I remember it, the cost of the actual patent taken out follows the patent. It is paid for by Western Electric if the patent goes to Western Electric. It is paid for by the A. T. & T. if the patent goes to the A. T. & T.

Conceivably a problem may come to the Bell Laboratories from Western Electric which developed material of patentable novelty during the course of its solution, but the patent may be in the field of patents which are owned by the A. T. & T. because, by long existing contract, certain kinds of things are Western Electric and certain kinds of things are A. T. & T. In that particular kind of thing the patent would ultimately reside in the American Company and the [fol. 7710] American Company would pay the cost of taking out the patent.

All of our requests are made by Western Electric, by A. T. & T. and by E. R. P. I. We may know and probably do know in specific cases what the genesis of that thing was but they are not put to us in that form, but rather as a problem for the Graybar Company, this is a problem for Western Electric. We have no relations with the Graybar Company in the same sense that we have relations with the other three.

Some of the materials used in the Bell Laboratories are purchased from Western Electric.

In the case of apparatus of Western Electric manufacture, we pay the associate price, the same price that any other part of the Bell System would pay for that material. In the case of raw materials which we buy through the Western Electric Company, we pay the same price that any other part of the Bell System would under whatever contracts the Western Electric Company has for purchasing that sort of thing. In other words, we may make

use, just as any other part of the Bell System does, of the Western Electric Company's general purchasing contracts wherever we can. Of course, there is a considerable amount of stuff, incidental stuff, which we buy directly from outsiders.

Frequently we have work that runs over a great many years before it results in anything commercial or anything that is used. Take a very simple, specific example. A good many years ago, telephone cables, the ordinary lead-covered cable which is so familiar to all of us, had the wires in it insulated with wrappings of paper, made out of old rope. The purpose of that insulating material was to keep the wire apart and a fundamental requirement for the best cable was to have as little mechanical material as possible between the wires and to have it of a character which would produce less energy losses in the cable. The best material that we knew of for that purpose was essentially cellulose, wood or vegetable fibre, and such as used in making paper, and the way in which we applied it, because we had to apply large quantities of it at a very low cost, was to have these fibres made into paper and cut into ribbon and the ribbon wound on the wires in a crumbled form. Because of the mechanical stresses applied to the ribbon in the process of winding it on the wires, the paper had to be extremely strong. This resulted [fol. 7711] in limiting the source of paper to paper made out of long fibre material and so inherently expensive. At various times suggestions were made and trials undertaken to use shorter fibred material such as wood pulp, which was as good from an electrical standpoint. All of these failed, however, because of the lack of mechanical strength. A considerable number of years ago someone suggested that since all that was required in the final product was a proper amount of properly distributed fibre around the wires, there was no necessity for going through all of the elaborate operations of paper making, that the paper might be formed directly on the wires, thus eliminating all of the actual processes in paper making, slitting and winding, and producing an end result identical with that theretofore obtained. This idea was so promising that work was undertaken for its practical development. Because of the many difficulties which we found to reside in forming a uniform layer of paper directly from pulp on the wires, this work extended over a large number of

years and has only recently come into the realm of practical application. It extended, I should say, not less than 10, in that order of magnitude. That is not an unusual example.

We have at the present time a considerable number of problems on which we have been working for many years and on which the work is not yet completed. Probably the most striking example of what you have in mind is found in the hand set which has come to be used commonly in the last two or three years. That problem, to my own knowledge, has been worked on assiduously for more than 20 years and has only recently come to a satisfactory solution, and the reason for it, for this long period of time, is found in the fundamentals on which the Bell System has built up its nation-wide plant because hand sets have been in common use in foreign countries for many years. Our difficulty in that particular case resided in the basic idea, which has been the fundamental of Bell System transmission development since long before my time, namely, that the transmitter and the receiver which are attached at the substation shall be each of the highest possible efficiency and of the highest degree of uniformity. Now, when you have a very highly efficient transmitter and a very highly efficient receiver and supply energy to the combination of the two as you do through a central or local battery, you have an [fol. 7712] arrangement which has a very great tendency to vibrate in its own natural period. If the transmitter and the receiver are brought into juxtaposition anyone who has tried the experiment with the ordinary desk set on a station which is not far distant from the central office, of putting the receiver in front of the transmitter knows what happens, the combination starts to howl and the higher the efficiency of the transmitter and the receiver the greater is the tendency to howl. In European systems where hand sets have been used for a long period of time, the difficulty, this howling difficulty, is obviated by making the transmitters and the receivers inefficient, but in our case, because we have built up a vast system on the desk set basis with the highest possible transmitter efficiency and the highest possible receiver efficiency we were estopped from using that solution. We had to have a solution which gave us a transmitter and a receiver, at least as efficient each as the transmitter and receiver of the desk stand, otherwise the introduction of the hand set would

produce an immediate degradation of the service of everybody who uses the telephones, but when we came to try to put a transmitter and receiver together, with a rigid connection through the handle, which could transmit vibrations from one to the other and maintain them to at least the same efficiency of the desk stand instrument, we produced an instrument which had a very great tendency to howl. Further, since the hand set can be used in more positions than the desk set was usually used microphone transmitters of the type which were entirely satisfactory in the desk stand were found to have positional effects, so that if one were lying in bed, for instance, and attempted to use the hand set, he might have a very different efficiency out of his instrument, and it took us many years to solve that physical problem satisfactorily and produce an instrument in the convenient form of the hand set, which would have the efficiency of the instrument, of which there were millions in use, without introducing this deleterious effect of howling or the equally deleterious effect of position which affected both transmission and affected the signalling over the circuits. As far as I know, that is the most striking one of the cases.

The failures are relatively few because of the way in which the work is conducted. What seem to be good ideas [fol. 7713] when they are initiated but which have only the inherent elements of failure, in general are caught long before they reach anything like a final stage. Either they result then in an abandoned experiment in its initial stages, or what is more usually the case, if the original idea was good but the reasoning at the start, because of lack of information, was faulty, the course of the development which was originally thought to be along this line is modified to another line and the end result is maybe a little different from what was preconceived, so that our failures in the ordinary sense are very, very few and I have no figures of percentage.

Quite a good many years ago when we were attempting to extend the length of open wire circuits, particularly in large ga-ge wires through the mechanism of loading, the application of the Pupin loading coils to lines, the question of the insulators supporting line wires became a very important factor because the standard glass insulators as we then had them, through leakage and electrical loss in the insulator itself, produced a very deleterious effect on

the transmission, and we sought to find a new and better type of insulator.

In this country glass was the standard which had been used for decades for insulating electrical wires but abroad we knew that they were,—particularly in Europe, that they were using porcelain and we made quite a large number of studies on porcelain insulators and came to the conclusion that porcelain insulators would give us much better results than glass insulators.

We ran into one difficulty at the start due to the relatively high labor costs in this country, which precluded the machining of porcelain parts, insulator by insulator, as they did in Europe, consequently the insulators had to be made, if they were to be used, within a reasonable cost by machinery processes, but that seemed to be a thing which we could get over because the porcelain manufacturers were already manufacturing high quality porcelain insulators for high tension lines and we finally through our elaborate laboratory tests arrived at the conclusion that we could make a very material benefit through the use of porcelain and that we could get a porcelain insulator of the character we wanted at a price which we could afford to pay and we embarked on the process of equipping some lines, quite long lines, with those porcelain insulators. At the start they were extremely good, but we neglected, [fol. 7714] through lack of knowledge, to take account of the bugs, insects, and we found after the first summer that because porcelain insulators were opaque and not transparent or translucent they were particularly sought for nesting places for bugs and that there were more bugs nested under the petticoats of porcelain insulators than under the petticoats of the transparent glass insulators, with the result that at the end of the summer all of the advantages of porcelain insula-ors had disappeared in thin air and we were worse off than when we started, so we abandoned the use of porcelain insulators and started looking for something else.

The directors of the Laboratories are Mr. Bloom, the president of the Western Electric, Mr. Stoll, the operating vice-president of the Western Electric, and Mr. Hosford, the vice-president of the Western Electric, in charge of manufacture. Mr. Bancroft Gherardi, the vice-president in charge of operation and engineering of the A. T. & T., Mr. E. H. Colpitts, the assistant vice-president of the Re-

search and Development Department, Mr. H. P. Charlesworth, the vice-president of the Bell Laboratories, Inc., and myself, seven of us.

The reasons for the organization of the Bell Telephone Laboratories, Inc., in 1925 were two essentially. First, that the laboratory function, as it was then carried on in the Engineering Department of the Western Electric had grown to such proportions in size and in character of work that it had outgrown the confines of a department of a subsidiary of the American Company and had attained to the stature of an associate company. That was one reason; and the other reason was, that as long as that very important function in the development and conduct of the Bell System remained a part of the Western Electric, a manufacturing organization, which was supplying material to operating companies, which were public utilities, the active direction within the organization of that function could not be vested in an officer of the American Company. I don't know what the law is, but under the general law, which was promulgated years ago with regard to railroads, it seemed very desirable that because it was primarily responsible for the conduct of research and development work, that an officer of the American Company should be the active director of the Laboratories.

Prior to that time, my predecessor, General Carty, as the head of the department Development and Research, while [fol. 7715] the titular head of the department, was not in actual control of the laboratory functions. So that reason, and the other reason brought about the formation on January 1, 1925, of the Laboratories as a direct subsidiary of the American Company in a form which permitted the vice-president of the A. T. & T., in charge of development and research to be, in his own proper person, the active executive of the Laboratories.

Without any change the personnel of the Bell Laboratories was on January 1, 1925, the same personnel that had been the Engineering Department of the Western Electric on December 31, 1924.

The Laboratories' researches in the physics of sound resulted in developments that produced the orthophonic phonograph.

It did result in the development of measuring devices, which were thought to have some possible application in the prospecting for oil, and I am not sure but what certain

small pieces of apparatus may have been turned over to organizations in the petroleum industry for their use.

At one time, it was proposed that we should undertake to do that sort of work by one of the large oil companies, because of the knowledge which we had in the field, which they thought would be of advantage in this prospecting business. But on a scrutiny by us, it appeared that that field was one so far removed from the normal field of our activities that it was not a proper field for us to embark on, and we never did embark on it.

Out of the work of any group—a large, organized group, such as is this laboratory, many applications outside of the specific field in which they are primarily interested, would be conceived.

Vacuum tubes as manufactured by the tube shop, operated by the Laboratories and for the account of the Western Electric, are used outside of the Bell System in such things as the services of the Army and Navy of the Government, where they involve communication,—radio or wire communication; they are used in the amplifying parts of Public Address systems, which may be sold to hotels or auditoria, playing fields or what not, wherever Public Address systems are used and they are used in the electrical [fol. 7716] parts, particularly the amplifiers of talking motion picture equipment, as it is manufactured by the Western Electric and transferred to the E. R. P. I.

The work on vacuum tubes began in the latter part of 1912 and has continued uninterruptedly since, in ever increasing amount, as is usually the case with any new and very useful tool, and the end is not yet anywhere nearly in sight.

The Development and Research Department of the A. T. & T. themselves did no physical development work, but they did a vast amount of study leading to the requirements for new and improved vacuum tubes, and in the testing of the final product and in the development of the applications of their use; but having no laboratories, they had never carried on work in vacuum tubes, in anything like the sense that people in laboratories do.

(Recess.)

(For deposition of George E. Folk, see Abst., Vol. IV, 1211-1230.)

JOHN G. ROBERTS, for defendants:

Direct examination.

By Mr. Haight:

I reside at Dobbs Ferry, New York; I am patent attorney, Bell Telephone Laboratories, Inc., and have been since January 1, 1925, the date of its organization. Prior to that I was assistant general patent attorney of Western Electric, from 1909 to end of 1924.

My department handles the patent matters for the Laboratories. After the patents are secured some are transferred to Western Electric and some to the A. T. & T. and others have not yet been assigned where the studies have not yet been completed as to which company it should be assigned to.

None go to E. R. P. I. Patents whose inventions are embodied in products sold by E. R. P. I. are assigned to Western Electric in some cases and in others they go to the A. T. & T.

As to those not assigned at all, we have not examined any of the patents issued during the current year for the pur- [fol. 7717] pose of determining their disposition. As to those issued prior to this year, we classify some of them as telephones and some as telephonic appliances and in accordance with the definition in the 1882 agreement between Western Electric and the A. T. & T. Those classifiable as telephones have been assigned to the A. T. & T. and the others to Western Electric. The remainder group have not yet been analyzed sufficiently to determine their classification, but they are assigned under the principles I have stated, regardless of who may be the inventors.

Occasionally I handle patent matters relating to inventions made in Development & Research Department, A. T. & T., and later worked upon by the Laboratories, and that comes about by specific request of the A. T. & T.

When an improvement invention has been made in the Laboratories, that is handled by my department. Then the question of to whom the patent is to be assigned is disposed of, as I have stated.

Patents on vacuum tubes generally go to the A. T. & T. I do not know of any subject matters upon which employes of the A. T. & T. have made inventions where the patents have been assigned to Western Electric. It is my under-

standing, for instance, that if an invention related to switchboard is made, the title to the patent would remain in the A. T. & T.

If the inventions are made by employes of the Bell Laboratories they are taken out and assigned to the Bell Laboratories at the time the applications are filed. Later on they would be disposed of in the manner that I have before stated.

We make recommendations with respect to foreign filings in most instances and our recommendations are generally followed by E. R. P. I. which files, in some cases, in foreign countries. There are certain other foreign patents taken out by the International Telephone & Telegraph Company pursuant to certain agreements made with that company and there are certain patents taken out by Northern Electric Company in Canada. Certain foreign patents are taken out in the name of Western Electric on our recommendations. I am thinking of some in South America and some in Canada and Newfoundland.

Assuming for example, that an invention is made by an [fol. 7718] employe of the A. T. & T. and then in the Bell Laboratories improvements are made upon that, as in the field of the movietone, and patents are secured through my department, those improvements patents are disposed of in accordance with 1882 agreement or remain in the Laboratories for future consideration. They may go, as I have above mentioned, to Western Electric or the A. T. & T.

FRANK W. JEWETT, recalled:

Direct examination.

By Mr. Haight:

Dr. Craft, in the Bell Laboratories Record, Vol. 1, at page 96, says:

"In the conduct of this work it has always been the aim to study broadly the problems of communication, paying attention not only to the electrical problems of telephony but particularly to the physical problems of what speech is and the mechanism by which we hear speech or music. In the last 12 to 15 years the results of our investigations have pyramided and now we have a fund of scientific knowledge and a technique which is largely responsible for our present

day telephony over wires and much that is fundamental to the present radio broadcasting art."

This publication appears to be in November, 1925.

I have no quarrel with the statement in that paragraph. I see that the paragraph is one of an article of some three or four pages, five pages, headed "Sound Recording and Reproducing." I have not read the remainder of the article so that I am simply taking the statement as it appears in that paragraph out of its context. But so far as that paragraph is concerned, I have no quarrel with the statement that is made.

In that same volume I of the Bell Laboratories Record, page 195, I notice the analysis of each dollar expended in what appears to be the 1928 program. I have examined the chart. This indicates that 71 per cent of every dollar which appears in the Bell Laboratories accounts goes to salaries. I should say that that was a reasonably fair thing. Actually [fol. 7719] in my own thinking I have carried in mind a higher figure for salaries,—roughly, of the order of 75 per cent of our entire expense, in the salary classification.

In Volume 2, which is bound in the same cover, page 67, there is an article that appears to be by Amos F. Dixon. I have read that which is part of the paragraph of an article entitled "Development of Communication Systems" and as a statement for that article I have no question on that, that is, systems of communication, and I think that is correct. That is to say, the requirements for systems originate in the Department of Development and Research or come to the Laboratories through the Department of Development and Research Department of the American Telephone & Tele- not read the rest of the article. The part to which I have referred reads as follows:

"The requirements which each development must meet are obtained by the laboratories from the Development and Research. That is only a part of the paragraph and I have graph Company, and in final analysis arise from the field and operating requirements, both present and future of the Long Lines Department and the associated companies. To these requirements, the Systems Development Department adds its views and past experience."

Volume 2, page 200, is an article by Joseph P. Maxfield. The first paragraph of that article refers to a contract. I know that a contract was entered into between the Wes

ern Electric and Vitaphone but I am not familiar with the terms of that contract.

The interest of the laboratories in this work—that is, the making and reproducing of moving pictures with accompanying synchronous sound records that is referred to—is an outgrowth of the development theretofore made of electrical processes of recording, the fundamental novelties of which were logical applications of the theories and the technique incidental to Bell System problems of transmission of speech and music.

In referring to phonograph records, there have been, as I recollect it at the moment, without having refreshed my mind in detail, three principal values to the telephone art of this work: One in the accumulation of knowledge with regard to what can be done in the way of making perma- [fol. 7720] nent records of telephone speech over regular telephone circuits looking to the possibility of sub-station recording devices which the subscriber might use in keeping a record of his own and his correspondent's conversations.

In the second place, we have had a very great interest in the development of very accurate and very fine phonographic records as a tool in the study of telephone equipment, telephone apparatus and telephone circuits.

To explain that particular interest it is necessary to realize that what we are dealing with in the telephone business in the last analysis is the production of electrical impulses which are mirrored images of the spoken word, evidence of those electrical impulses or re-transmission into sound impulses and finally their transmission into the ear of the distant party, and the one thing that we are dealing with is the fidelity with which the spoken word at one end of a telephone line is conveyed to the recipient at the distant end of the line.

Every instrumentality that is involved, from the first instrument opposite the speaker's lips to the last instrument before the orifice of his ear has an effect in affecting to some degree the characteristics of the vibrations as they issue from the speaker's mouth, and it is of the utmost importance to us to be able to determine how far each and every part and all of the parts act to modify the spoken word, because beyond a certain point, no matter how much en-

ergy you may supply to the receiver, if it was not in the form of intelligible speech the telephone conversation would be useless.

Now, for many years, since we are dealing in the last analysis with speech and hearing as they are evidences of human characteristics, the ability to transmit and reproduce has had to be measured against a human standard. For many years the only means that we had of measuring the goodness or badness, the ultimate goodness or badness of a particular piece of apparatus, a particular system, a particular combination was from the process of making actual speech and hearing tests, but human beings differ among themselves with regard to the goodness or badness of their speech and hearing, and each individual varies from time to time, depending upon his condition, so that those tests were difficult to make to the desired degree of uniformity which is essential for a final development, and the only way in which we could progress by that process was [fol. 7721] by the,—what you might call the statistical method, by the making of enormous numbers of tests, involving the same individual in many repeated tests and many individuals in many repeated tests and from a statistical analysis, getting an impression. To whatever extent we can insure that the impulses given to the initial apparatus, the transmitter, are accurate and duplicable we have improved the value of our tools, and as a phonograph record, in so far as it is indestructible, is a permanent record, which can be used over and over again with a knowledge that the initial impulses are identically the same. It is of value.

To that extent it is of very great importance to us as a tool in the development of the telephone art, so that we have had a very great interest in phonograph records from that standpoint.

There is a third use which has developed and which is of extreme importance in the telephone art of the present day and in which all of our work on phonographic reproduction whether by means of the ordinary disc type of record or the film type of record has been of very great value in the telephone business, and that is this: It has to do with the operation of the dial system of telephones, the common dial system in the day-by-day giving of service to the public.

When we injected first the dial system into the telephone business we injected a mechanical means of passing orders

into a system which had been developed to very large proportions around the passing of orders by word of mouth from the subscriber to a human being, the operator, who carried out those orders. We introduced in the dial system a means by which the subscriber's orders were passed by an operation of his finger instead of his lips and since we could not change the system, the entire system of the United States over night from a manual system to a dial system, but had to make the introduction in gradual steps, we had to have a scheme of operation which was usable in connections from dial telephone to dial telephone, from dial telephone to manual telephone, from manual telephone to manual telephone and from manual telephone to dial telephone.

In so far as it is possible to do it the operation of a subscriber at a given station, in getting the desired number, [fol. 7722] must be the same, irrespective of what kind of station that distant station is. The subscriber has no knowledge other than the number which he finds in the telephone directory. He cannot be supposed to know the intricacies of the mechanisms by which his orders are carried forward. In other words, his operation must be the same irrespective of what kind of telephone his correspondent may have or what kind of a central office he may be connected to.

In the case of the manual telephone, which he had been accustomed to using, he passes his orders by word of mouth, he knew nothing further than that he gave those orders to some human being, and in a great majority of cases, except where errors, either of his own making or somebody else's making interposed, he got the distant desired number or he received a busy signal or a don't answer signal and that had to be the case after the dial was introduced. If he was one of those who had a dial telephone he dialed the number, he said nothing until he got the distant party after he dialed the number and in due course he got the distant party. If his call was over a dial telephone connected to his own exchange or to another dial exchange in the same city the whole thing went through as a mechanical operation. If, however, the party that he desired to reach had a manual telephone, then at some stage of the game a human being, a human switch had to appear in the picture and this mechanically dialed order had to be given to that human being.

In the early systems, the very earliest introductions of the dial system that ordering was done by what was known as a

carriage call. The dialing of the number by the originating subscriber set up in front of an operator at the distant station the number of the desired party. The operator received, through a lamp signal, an indication that a call was coming in on a particular trunk and then in front of her appeared a series of numbers, for example, 1, 2, 3, 4, which indicated that the call on that particular trunk was destined for station 1, 2, 3, 4. She got that number through her eyes and she plugged the end of the trunk into the desired subscriber's line.

In large offices, very large offices, it may be possible to segregate the operators into two groups, one group to handle incoming calls from manual offices in which they received the numbers in the ordinary way from the distant [fol. 7723] operator by word of mouth, through their ears, and another group who receive orders only from dial originating stations, and all of their orders came in the form of these call indicating affairs, but it is not always possible to segregate operators in that way, particularly in the smaller or outlying offices where only a small fraction of the calls originate at dial offices and in consequence the operators at those places have to perform their functions of making this last connection under the guidance of orders which came in in two different ways; one set of orders came in through their ears and another set of orders came in through their eyes. That is, the first are those which originate at manual stations and the others came in through orders which originated at dial stations. In other words, it put a double burden on the operators and an obstacle in the carrying on of efficient and rapid telephone switching, so it became apparent at a very early stage that if we had some way of translating those finger dial impulses into the spoken word at the distant station, then the operator at the distant station need know no more about the origin of the call than the subscriber himself knew about the character of his correspondent's telephone, and in the modern machine switching central office areas there has been developed and is being used with increasing amount of phonographic type of apparatus by which, at the distant station, the dialed impulses which are designed to connect the line to a manual subscriber are translated, through a phonographic apparatus into the spoken word; the number arrives in the form of a set of impulses which, in the older system, would have set

up the number 1, 2, 3, 4, but actually what happens is that they are passed to the operator in the form of the spoken word, 1, 2, 3, 4. Except as she may be able to distinguish between phonograph 1, 2, 3, 4 and a spoken 1, 2, 3, 4, she has no different kind of orders whether the call originated at a manual office or whether it originated at a dial office, and she consequently performs her functions with one simple guiding rule to tell her what to do. She does not have to use her eyes in the completion of any of the calls except in so far as she has to see which jack to plug the plug into, but she gets her orders through her ears in all cases. In some cases they come to her through a word spoken into a microphone which goes directly into a telephone receiver. [fol. 7724] In others, they come to her through the impulses which start by the subscriber's finger but end up in her ears in spoken words.

Now, the extent to which, and the ability which we have of making that final spoken word as nearly as possible like the human spoken word, the more efficient is the system, so that we have had a very great interest in phonographic reproduction in any form for that purpose. Those are three very important ways in which we have been interested in phonographic reproduction and very accurate phonographic reproduction.

The knowledge required in that development has been useful in the phonographic art disassociated from telephony, and, conversely, the information which we have gained in our work on the phonographic art has been of inestimable value to us in the carrying out of our development of those lines, as I have described. Our Research and Development in respect to phonographic records has been practically applied to phonographic instruments, outside of telephony.

Our initial work in the phonographic art per se came as a direct result of our work in the telephone field. Our subsequent work in the telephone field has been largely influenced by the work which we have done in the phonograph art.

In the present stage of scientific and engineering knowledge, the only known way of producing what is known as a television image is to make use of the property of the human eye, the retentive property of the human eye which makes motion pictures a possibility. This property, which

results in the impression of continuity of motion being sensed by the brain, if the succeeding images are sufficiently close together but of moderate duration which is that 1/16 of a second that we hear so much talk about.

Making use of that property, all developments of television in the present state of our knowledge are in fact technical modifications of a single process, which is to view the object to be transmitted a very large number of times in successive small increments which viewing is in an orderly fashion across the whole image and to view the image with this multiplicity of scannings, at least 16 times a second, and transmit the electrical impulses which result from that process to the distant points and there reassemble them. It is, [fol. 7725] in effect, to take a plane surface and string it out into a line, making use of the fact that you have a 16th of a second to do this kind of a thing in, and then at the distant end of the line re-transpose one-dimensional space into two-dimensional spaces. That process, by whatever means of scanning or by whatever means you reproduce, in so far as the electrical impulses are concerned, result in what are in effect currents of very high frequency, and whenever you have currents of very high frequency you thereby have a wide band of frequencies that you have to deal with in your transmission system, whether it be by wires or whether it be by radio, so that there is a limitation in the transmission of television images which inheres in conjunction with the band.

The bands are very, very much wider over a circuit, whether it be wire or whether it be radio, over a channel which is capable of transmitting high frequency current and which is capable of transmitting a television image, over that same circuit you could transmit many telephone messages and very much larger numbers of telegraph messages and as the goodness of the television image goes up toward perfection, the width of the band increases, consequently the number of possible telephone messages or telegraph messages increases. Of course, it is not possible in the present state of the art to produce or to reproduce,—leaving out the transmission part of it,—television images of the goodness of motion pictures, that is, quite irrespective of the transmitting channel; but if it were possible to produce at the sending end the electrical currents corresponding to the perfect scanning, and at the transmitting end to repro-

duce those in a perfect image, the width of the band would be a wide band.

Television is a transmission of intelligence of a kind, just as telephony is a transmission of intelligence of a kind or telegraphy is a transmission of intelligence of a kind. They are not the same kind of transmission, nor is the intelligence which they transmit identically the same in the two cases. In that sense, they are different arts.

In the sense that they involve the same kinds of apparatus, the same kinds of the circuits, the same laws governing the transmission of currents, they are part and parcel of the same art and there is no sharp line of demarcation between the things and from the standpoint of the development of the telephone art, viewed narrowly as the transmis- [fol. 7726] sion of speech between human beings, knowledge gained in the development of the circuit requirements for television plays a very important part, for the reason that anything that we learn with regard to the characteristics of circuits which will transmit this wide band of frequencies is immediately applicable in the art of telephony because it automatically gives us the possibility of obtaining over a single channel a multiplicity of telephone channels of the narrower art.

They are certainly different, but how different is a pure speculation which resides in one's judgment of how far the television art may go toward the production of perfection and how widely that can be distributed to people who may want to use it, but I will say this, that in so far as the economics are involved in the cost of the transmission channels, then you must say that the television art is a much more expensive art than the telephone art.

On account of their work in that field, the most outstanding one, who has devoted a considerable part of his time to the development of television and what is closely allied to it, the thing that we talked of yesterday, telephotography, is Dr. Ives. I suppose he is the most outstanding man in the world in that particular field. He is essentially a man,—even before he came to us,—who was skilled in the photographic art and he has devoted in recent years a very considerable part of his time to the development of telephotography and television.

His work on television goes back certainly five years and possibly six or seven, at the outside. The fundamentals on

which systems of television are based are very old,—40 years old. It is only within recent times that those ideas have had any possibility of practical application, through the advance of general science.

Improvements of things that are old and new both—the most outstanding one that occurs to me at the moment in which a very great advance has been made in the last ten years, that is, an advance which has influenced all of the longer distance telephony,—I would say all telephony over a very few miles in length,—has had to do with improvements of the loading coils which are an integral part of every circuit of more than the very shortest lengths, and that improvement has grown primarily out of our fundamental work to develop new magnetic material.

[fol. 7727] Originally loading coils were made which were magnetic affairs, coils of wire wound around a magnetic core—were made on magnetic cores which were composed of the fine iron wire. They were large and they were expensive and they took up a large amount of space in the manholes or on the poles on which they were installed and they had certain disadvantages. In our endeavor to find a magnetic material which was better than iron wire, we were led first to the making of these cores out of powdered electrolytic iron, each particle of the powder being properly annealed and properly insulated and then pressed into a form under enormous hydraulic pressure. That resulted in improvement in quality, reduction in size, and reduction in cost. Then in our further endeavor to get improved magnetic materials, we developed what were known as permalloys. They were alloys of magnetic materials which in the condition of magnetic fields as they are in the telephone and telegraph art, have very remarkable magnetic properties,—very many times more magnetic than the best iron and steels of the older art, and the iron dust loading coils which had been a great improvement over the iron wire coils have been superseded by cases in which the magnetic coils are permalloy or alloys of the permalloy type and they are very small coils, much less expensive than the older coils, occupy very much less space and in consequence are used in very great numbers. That work has progressed enormously in the last ten years. In fact, I think that the whole supersession of the earlier coils in new installation by permalloy has taken place in that period of time. There

have been very great improvements, of course, in the efficiency and economy of repeaters. There have been very great improvements in the development of electrical filtering devices, those devices which enable us to confine the frequencies that we are interested in, within defined limits and thus make possible not only better quality but make possible the putting of more circuits over single channels.

There have been very great improvements in the development through the use of vacuum tubes of electrical filters and our general knowledge of the way to combine these things in what is known as carrier systems of telephony and telegraphy by which you multiplex a number of channels of telephone or telegraph over a single channel.

There have been substantial improvements in cable [fol. 7728] during that time in two directions, one in the direction of making possible the use of smaller wires and so more circuits in a given area; and second in the arrangement of those wires in the cables. I spoke yesterday of the improvements with regard to insulating material.

There have been decided improvements in toll boards. That art, as I understand it, is, however, one in which the improvements were in the nature more of refinements on existing things and the provision of added facilities to enable more rapid and more economical operation.

Improvements in the local switchboards helped in the long distance service very little, I think, except in so far as the same apparatus is used in all kinds of switchboards; improvements in plugs, jacks, cords and relays is common to the entire switching business, so that whatever is done to improve individual pieces of apparatus primarily for one service, if it is a real improvement, finds its use in all other similar kinds of switching.

The carrier system means—all forms of telephony, even the common or garden variety of telephony is a carrier system in a way, that is, in the telephone transmitter you superimpose alternating pulsating current on a direct current, a current of zero frequency, if you will. To that extent it is a carrier system. In the things which are commonly referred to as carrier systems the current on which you impose the fluctuations of the spoken word is itself an alternating current of a constant frequency and what you do by the process of imposing those things is what we call modulating; we modulate the frequency and in the process of modu-

lating, which is what you always do when you mix two frequencies together, when you make one frequency affect another frequency, you initially end up with three things in the output side the residual of the carrier on which you have loaded this thing, and two things which we call side bands which are groups of frequencies above and below the carrier frequency, which have a width equal to the width of the frequency of the spoken word and which are merely the frequencies of the spoken word added to or subtracted from the carrier. What you do by the process of modulating these high frequency currents is, in effect, to raise the frequency,—you can use either of these side bands or both, but in general one, because there is no object in using [fol. 7729] both. In many cases it simply means a duplication of energy. What you do when you take one of these side bands, we will say the lower side band of a particular modulation is, in effect, to raise the frequency of the human voice from one level to another—the higher level, roughly the level of the carrier current. The frequency band which you get there, while it is as wide as the frequency band of the voice would be, is in most cases, unintelligible to the human ear and in many cases undistinguishable by the human ear, despite the fact that it has all the characteristics of the frequencies in the lower band and at the distant end of the line you do the reverse process, you take the carrier and reduce it to the lower level. Within the limits which are imposed by the width of the band of the human voice and the necessity to avoid interference, you cannot have those bands overlap in frequency without producing cross talk. You can theoretically put as many telephone channels over a given telephone circuit, over a given pair of wires as you can conduct high frequency currents over it. That is, if you took the entire theoretical,—if you took the entire range from zero frequency to x-million frequencies and if you can transmit those things non-interfering, you can have as many telephone channels as there are multiples of the width of band of ordinary speech on there. Theoretically, then, you can do an infinite amount of things over a given number of wires or any other kind of channel, radio or anything else over which you can conduct this frequency but practically you are limited by the elements of cost principally and complexity of apparatus and reliability of service of large magnitude because, in effect you are putting

all of your eggs in one basket when you use one pair of wires to take the place of many pairs of wires between two corresponding points. But even leaving aside the question of reliability, the question of economics begins to run very shortly after you reach a reasonable number, not too large, 4 or 5 or 6, maybe a few more, superimposed channels of telephony and maybe two or three times that number of telegraph channels because telegraph channels are a little bit narrower. That element comes into effect because at the transmitting end, if you are going to have many channels, and at the receiving end, if you are going to separate those channels, you must have a very complex apparatus, particularly complex in the form of these electrical filters, [fol. 7730] which allow only a particular group of frequencies to go through that filter and the question of complexity soon reaches the point where it is more economical to provide an additional channel than it is to provide the complex apparatus at the terminal ends, but theoretically you can transmit an enormous number of telephone and telegraph conversations over a given channel without interference.

"Given channel" means a pair of wires or grounded circuit,—if you are using a grounded circuit, as you do in the case of a submarine telegraph cable or a radio channel. Radio is not different from telephony or telegraphy, in the sense that telephony or telegraphy are different from each other. Radio is merely one of the many ways of conducting electrical impulses and those impulses may be used for a variety of purposes or radio as they are used for a variety of purposes by wire, such as the transmission of power, telegraphic communication and telephonic communication.

The switchboards, in so far as they facilitate the operations of setting up connections, have had to do with an increase in speed of service, because of the development of new methods of handling what are commonly known as toll service and the elimination of operators permitting one operator to do what formerly took two or three in the built-up connection.

The carrier method was made possible by the vacuum tube because of the properties—the remarkable properties which we were able to develop in vacuum tubes, once the principle of those vacuum tubes was disclosed; the principle of distortionless amplification and the property of utilizing that

device as a generator of high frequency currents and the modulator of high frequency currents.

An article appearing in "Bell System Technical Journal" of January 30, 1930, entitled "Telephone Communication System of the United States," by Mr. Gherardi and myself, is a general article which represented the communication system of the United States at the time it was written, in so far as it had been developed to give local and long distance service within the United States. The main body of it has to do with the regular national telephone service and at the end there are a few notes with regard to adjunct services where telephony is employed, such as telephony to mobile stations, ship-to-shore telephony, transmission of pictures, program transmission, and a few slight references [fol. 7731] to by-product things which have grown out of our development work covered in two or three paragraphs.

It was presented to the World Engineering Congress at Tokyo, Japan, in October, 1929. I have not read the article since it was presented, and whether my views have changed in two years since it was presented, in any detailed point, I would have to read over the article carefully to see. So far as the general things are concerned, as stated there, my views then expressed are substantially what they are now.

Mr. Haight: I would like to offer the whole article as an exhibit, subject to the right of the other side to examine the same in any way they may see fit.

Mr. Blackman: I object to it at this time, but as I say, in order to save time and avoid a multiplicity of questions, I would be glad to have Dr. Jewett read it and if he says now that he agrees with every line of it, then, of course, I will enter into a stipulation.

Mr. Haight: That is entirely satisfactory. If there are any limitations, Dr. Jewett can state what they are.

Mr. Blackman: That is just the point I want to develop, if there are any.

Mr. Haight: In the meantime we will refer to that as Defendant's Deposition Exhibit No. 1, merely as a matter of identification.

The Witness (continuing): Referring to a pamphlet purporting to be published by the Western Electric relating to No. 12—A Loud Speaking Telephone Outfit—I agree with the following as of the time it was written:

"Recent developments in vacuum tubes and vacuum tube

amplifiers have made it possible for the engineers of the American Telephone & Telegraph Company and the Western Electric Company to design what is now known as the No. 12—A Loud Speaking Telephone Outfit, a practical device that will successfully meet the severe conditions of railroad service."

I think from looking at this device, that this thing must have been written some years ago. It says 1/11/24. That statement undoubtedly referred to the fact that by the development of the vacuum tube amplifier, we had placed at our disposal a tool for so amplifying ordinary speech current as to make it possible to reproduce it in a loud speaking telephone such as railroad requirements neces- [fol. 7732] sitated for the guidance of tower operators and other people who could not use ordinary telephones and had to depend upon, if they used telephone at all, had to depend on loud spoken telephonic communication.

Referring to another Western Electric pamphlet—I agree with that statement except possibly in the implication there may be in it that that was a perfect final device. That was written seven or eight years ago. If I agree that that was a perfect final device, I would be agreeing with something that I do not believe now.

I will read it into the record.

"With the permanent place that radio has attained within a comparatively brief period in the daily lives of thousands, new standards have been established not only by those engaged in the design and manufacture of apparatus but by the public as well. Those who were once satisfied to get 'something' by wireless—no matter how weak or how imperfect the reproduction—soon demanded volume enough to fill a room; then that quality and naturalness of reproduction that make music and speech a real pleasure; and now there is demanded an efficient cabinet type of loud speaking telephone that will please the eye.

"This last requirement is met by the No. 14—A Loud Speaking Telephone Outfit which makes use of the latest developments in the electrical communication art and is mounted in an attractive and unobtrusive cabinet. It is a combined audio frequency amplifier and loud speaking telephone. When used as an adjunct to vacuum tube radio receivers, it provides amplification sufficient to make received radio programs audible practically without distor- throughout a large room."

Referring to a pamphlet marked "Speech Input Equipments for Use With Wire Lines as an Adjunct to Radio Telephone Broadcasting, Western Electric Co. published in U. S. A. 1925"—I agree with the statements marked on pages 1 and 3. I assume that the Western Electric at the time this pamphlet was issued did have these things available. The portions referred to are as follows:

"To provide means whereby events that take place in points remote from radio telephone broadcasting stations may be transmitted to the radio audience. Western Electric Speech Input Equipment, in a number of types, have been [fol. 7733] made available to meet practically any condition that may arise."

That was on page 1. On page 3 the following:

"One of the important requirements imposed by the companies of the Bell System, in order to avoid interference with other lines, is an upper limit to the power level delivered to the lines by the speech input equipment. The volume indicator which is described below is an instrument which may be used to indicate the level put upon the lines."

The only qualification that I would make to that paragraph is that this word "events" in here must refer to speech events; it does not refer to visual events; it is a speech event.

The next pamphlet is one entitled "Amplifier No. 6034-A," bearing upon its upper cover also the legend "A Western Electric Product." The matters are the two appearing on the first page and I agree with them.

The first part is as follows:

"Western Electric Amplifier No. 6034-A. A development of Bell Telephone Laboratories, Incorporated, the Research laboratories of the American Telephone and Telegraph Company and the Western Electric Company."

Below that:

"To provide a means of making entertainment from phonograph records available in rooms of average size or in widely separated areas, some method of amplifying the entertainment electrically and transmitting it by the same means is required."

The next is a pamphlet, Western Electric Company No. 10-A, Loud Speaking Telephone Outfit, and I agree with the statements within the poetic license of the man who

wrote this first paragraph as to what constitutes pleasure. The portions referred to are as follows:

"Western Electric, No. 10-A Loud Speaking Telephone Outfit. The widespread interest displayed in the receiving of broadcasted news, music and entertainment by means of private radio telephone installations has brought with it a demand for certain auxiliary types of equipment. Foremost among these is the loud speaking telephone outfit which is capable of amplifying the output of a radio receiving set so as to satisfactorily fill a fair sized room with speech or music. In providing facilities for all members of a family group, for other gatherings, to enjoy the entertainment, the greatest satisfaction can usually be obtained by providing [fol. 7734] a good loud speaking telephone outfit. The proper design of an efficient radio speaking telephone and its associate amplifier represents one of the highest achievements of the electrical and acoustical arts as they exist today. For several years past the engineers of the Bell System, that is, of the American Telephone & Telegraph Company and of the Western Electric Company, have carried on extensive investigations upon the loud speaking telephone with the object of developing a wide variety of public address systems. On the basis of those investigations the Western Electric Company is manufacturing a loud speaking telephone outfit suitable for use as an accessory to a radio receiving set."

The next one purports to be a pamphlet issued by the Western Electric Company and bears upon its outer face the legend "The No. 2-A Audiometer, a Western Electric product." I agree with the statements marked except in so far as those statements imply that the audiometer was developed for purposes outside of the telephone business. The statements are:

"Western Electric No. 2-A Audiometer. A Development of Bell Telephone Laboratories, Incorporated, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company.

"The importance of accurately determining the acuity and quality of hearing in delicate functional and diagnostic examinations has long been recognized. Taking advantage of the possibilities of the use of electricity in sound measurements and drawing upon its experience in designing ap-

paratus providing electrical means for amplifying and transmitting sound, the Bell Telephone Laboratories has developed for the Western Electric Company several different types of Audiometers capable of meeting a wide range of requirements."

The audiometer was developed in its fundamentals primarily as a tool to assist in the proper development of telephone transmitters and receivers. It is essentially a device which permits of the accurate quantitative measurement of response of the human ear to frequencies over the entire range and in values within the range of the human sense of hearing. A knowledge of these fundamental characteristics of the human ear, both in persons of normal and persons of abnormal hearing, is absolutely essential to a proper de- [fol. 7735] velopment of telephonic apparatus, particularly transmitters and receivers, and the audiometer was devised as a tool in the solution of a purely telephonic problem. The fact that it did give a means of measuring acuity and quality of hearing for other than telephonic purposes was purely incidental although of very great importance in the medical world and the instruments to which this paragraph refer were the reductions to practical form for use by aurists of the apparatus previously designed purely as a tool in telephonic research.

The next pamphlet is one bearing upon its face the legend, "Western Electric Public Address Systems." I agree with the statements, marked on pages 3 and 5, with the same reservation as in the preceding question to any modifications that these instruments were designed primarily for the Western Electric.

My explanation is that the loud speaking telephone was designed primarily as an adjunct to the service of the Bell System to make possible the transmission at a distance the spoken word of orators or speakers in a distant place. The statement at the bottom of page 3 in reference to the Madison Square Garden exercises at the time of the burial of the Unknown Soldier is a very good illustration of the objective which we have in designing loud speakers for use in connection with the telephone plant and as in the case of the audiometer, having designed loud speakers and employed them in the telephone plant, the usefulness of the same things for more local purposes led to the development of the things which are described, I presume, in this bulletin.

The parts referred to are as follows:

"Western Electric Public Address Systems. A development of Bell Telephone Laboratories, Incorporated, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company.

"Introduction. Ten years ago the Western Electric Company made available the first Public Address Systems to provide means whereby speech could be delivered clearly and faithfully to large assemblies of listeners, numbered in thousands instead of the mere hundreds, who formerly constituted the audiences within the range of full audibility.

"During this decade four Western Electric Public Address Systems were developed and introduced covering every commercial need that has arisen. Each of these systems was preeminent in its class and generally selected [fol. 7736] where insistence was placed upon dependable, flexible and simple operating equipment with ample volume and clarity."

The next part of page 3 to which attention was called reads as follows:

"From the first large installation in old Madison Square Garden, where the audible services in honor of the Unknown Soldier were reproduced in 1921 down to the present long roster, careful analyses have been studied, practical tests made and on the basis of the findings, improvements effected."

The part referred to on page 5 of this pamphlet reads as follows:

"Systems Nos. 5, 6, 7 and 8 still further enhance the value of Western Electric equipment because of the much larger areas it is possible to cover, the extreme simplicity and dependability of operation at all times, the perfect tonal quality of voice or musical instruments as transmitted alone or in combination, by the great advantage of A. C. operation by greatly improved loud speaker units and projectors and finally because of the important fact that design, workmanship and performance of each part which make up each system are based upon the Western Electric Company's and Bell Telephone Laboratories' knowledge, experience and reputation as pioneers and leaders in the field of sound transmission apparatus, as evidenced by the tele-

phone and telephone apparatus that are the standard for the world."

With reference to the words "Is it available," in that first sentence, the Western Electric Company made available, and the observation is that available there refers to the Western Electric Company as a manufacturer of equipment and not as an originator of the idea of the development of a loud speaker, which was a problem that arose in the American Telephone & Telegraph Company.

The next pamphlet is one which, upon its outer cover, bears the words "The No. 1-A Stethoscope. A Multiple Electrical Stethoscope," parts upon page 1 and on page 3 are further parts ending at the top of page 4. I find myself in a position not to make a categorical acceptance or denial of the statements, although in general as a piece of advertising literature I think the statements are substan-
[fol. 7737] tially correct. On page 1 the title is: "The Western Electric No. 1-A Stethoscope, a Multiple Electrical Stethoscope."

"Since its discovery by Laennec over one hundred years ago the stethoscope has proved indispensable in the study and diagnosis by auscultation of pathological conditions of the heart and lungs. It has long been recognized, however, that the stethoscope in its various forms has certain natural limitations and improvement has had to wait upon electrical research, development and adaptation."

As regards that paragraph 1, not being a physician, have no knowledge of the gentleman who is supposed to have invented the stethoscope, nor the time at which the stethoscope was invented, so I am not in a position to comment on that.

The next quotation is:

"The development of the vacuum tube amplifier gave rise to hopes that the stethoscope, purely a mechanical device, might be improved. Early experiments indicated that heart and chest sounds could be magnified and reproduced faithfully by electrical means but certain difficulties experienced with early forms of vacuum tube amplifiers had to be overcome before reproduction by this means could be made satisfactory."

I have no comment on that paragraph. So far as I know

it is entirely correct. The next quotation is at the top of page 3:

"These difficulties resulted from the fact that the amplifiers were efficient at low frequencies and over-emphasized the higher frequencies. In addition, the combination of the ordinary telephone mechanism and an amplifier was shown to be impracticable inasmuch as the telephone employed a carbon transmitter producing noise which, when amplified with the body sounds, is annoying and tends to obscure the latter."

I have no comment with regard to that paragraph. It is a statement of fact, as I understand it. The next paragraph is:

"The elimination of these obstacles to the development of an efficient electrical stethoscope has been accomplished by research work carried on for a long period in the laboratories of the American Telephone and Telegraph Company and the Western Electric Company. Of primary importance has been the development of a special vacuum tube amplified. This amplifier combines enormous amplification [fol. 7738] capacity with practically distortionless reproduction over the entire range of frequencies, of interest in auscultation. The development of a special electromagnetic detector or transmitter eliminated the difficulties inherent in reproduction by carbon microphones. The development of the electrical filter by the same research organization also made possible the suppression of sounds outside of the band of frequencies to which it is desired to listen."

My comments on that paragraph are that they first make clear that the research laboratories referred to at the time this pamphlet was written, published in January, 1925, refer to the laboratories' predecessor to the formation of the Bell Telephone Laboratories, Inc., but more particularly they refer to the fact that the special vacuum tube amplifier referred to here is merely an outgrowth of the development of amplifiers for the same general purposes for use in the telephone business quite aside from any use in the medical field as stethoscopes. Our own problems required us to have, if we could have them, amplifiers which would do identically what is here described and they were developed for that purpose, and the fact that these same amplifiers, or slight modifications, were found to serve the purpose in

the medical field is an incident rather than an objective in the development of amplifiers, and the same applies to filters.

This is the next quotation:

"These three basic developments, supplemented by study and research devoted to the producing of undistorted sound transmission and several years of work in collaboration with specialists in auscultatory diagnosis resulted in the solution of these important problems in the form of a multiple electrical stethoscope known as the Western Electric No. 1-A Stethoscope."

I have no comment on that last paragraph, which is a statement of fact. The application of the things developed in the telephone field to practical, useful forms in the medical field require the co-operation of the research, physical research people with the specialists in the medical field who knew what it was that they wanted to obtain, so that statement, as far as I know, is correct.

The last of this series is a pamphlet bearing upon its outer cover the words "Public Address Systems Nos. 1-A [fol. 7739] and 2-A Western Electric Company." Parts on page 3 two instances and on page 5, one instance. I agree with those observations and statements except for a comment on the first paragraph of which I have no understanding, as to how long the need for this thing has existed. The author says 20 centuries. I don't know whether it is 20 or 40 or 100.

Except for that comment, I agree with those statements with the same reservation which I made,—same explanatory reservation which I made with regard to the preceding similar one on public address systems as to the origin of the need for those things, and this is purely a reduction to practice in more detailed form of uses outside of the purely telephone field.

The material to which attention has been called reads as follows:

"Western Electric Public Address Systems Nos. 1-A and 2-A. The well known and widely used Western Electric Public Address Systems Nos. 1-A and 2-A have been designed to meet a need that has existed for twenty centuries but could not be satisfied until their advent."

The second occurrence referred to on this first page is as follows:

"The necessity for artificial amplification and direction of sound was obvious, so the research engineers of the Bell Telephone Laboratories, Inc., the research laboratories of the American Telephone & Telegraph Company and of the Western Electric Company addressed themselves to the task of developing a system of loud speaking telephones that would meet the need."

The parts on page 3 are as follows:

"The efficiency of this system was demonstrated during inauguration ceremonies of the late President Harding on March 24, 1921, when by its use an audience of more than 125,000. * * *"

March 24th Well, that is written that way, but it is obviously a misprint.

"* * * by its use an audience of more than 125,000 people gathered before the National Capitol at Washington was enabled to hear distinctly the President's Inaugural Address."

The next occurrence on the page is as follows:

"Where the number 1-A public address system can be used to amplify and project sound: In large auditoriums, [fol. 7740] stadiums, baseball and football fields, outdoor mass meetings or political meetings and announcements of election returns, armories, mines, steel mills and other large industrial enterprises, vehicular tunnels, steamship piers, to handle large crowds by police and fire departments, production of motion pictures, drill grounds and training camps, railroad and trolley terminals, large building and construction enterprises."

And the item on page 5 is as follows:

"Where the Western Electric No. 2-A public address system can be used: Hotels, for use in banquet halls, for reproducing music of an orchestra in as many locations as desired and for paging guests or making announcements in cases of emergency. Theaters and other auditoriums, stock market and trade exchanges, colleges and schools, for use in large lecture rooms, for emergency announcements, for directing class drills, dance halls, steamships, steamship piers, department stores, prisons, hospitals, county fairs,

private Pullman car or automobiles so audiences assembled around them may be addressed."

I have here a bulletin of the National Research Council which is a subsidiary, if I can use that word, of the National Academy of Sciences, which latter is the only nationally chartered scientific organization in the United States. It was organized just prior to the United States entry into the World War as a piece of machinery to be operated for the national good under the aegis of the National Academy of Sciences and designed to provide for the mobilization of the scientific knowledge of the United States in all its fields, for matters concerned with the national defense, national welfare and the stimulation of pure and applied science.

It functioned during the war largely under specific Presidential proclamation as the scientific, central scientific agency of the Government, and subsequent to the war it has functioned as a part of the National Academy of Sciences for the development of fundamental and applied scientific research.

In carrying out those functions in this present or peacetime capacity it operates through a number of divisions, representing roughly the divisions, the general divisions in the fields of pure and applied science, which divisions are constituted of representatives designated by the national [fol. 7741] societies in the respective fields and appointed by the National Academy of Science under the powers of its national charter.

Each division of the National Academy of Sciences has a chairman, not a permanent chairman, but one appointed for a number or a period of years, and always a very prominent man in his particular field who devotes his time during his appointment to the affairs of the Academy and he receives a salary for his services.

The chairman of the several divisions and certain members of it constitute the council of the National Academy of Science.

It occupies and is the joint owner of a very large and monumental building in Washington not far from the Lincoln Memorial, which was made available to it and to the National Academy of Science, its parent organization, through the munificence of one of the national foundations.

I was instrumental in the formation of the National Research Council partly because of my membership in the Na-

tional Academy of Science and partly because of my activity in the general field of science. For a number of years I was the chairman of its engineering division but at the present time have no official connection with the National Research Council, although I am still actively interested in its work.

In connection with my chairmanship of the Engineering Division I would make this qualification with regard to the statement above, the statement preceding, as to emolument, by saying that the Engineering Division of the National Research Council is different from any of the other divisions in that its chairman does not devote all of its time to his work nor does he receive any emolument, the emolument in the case of the Engineering Division being paid to a permanent officer who is known as the director of the Engineering Division and he receives the same salary as the chairman of the other divisions.

This peculiarity in the case of the Engineering Division arises out of the vast field to be covered by the division and from the fact that men of prominence in the engineering field, in general, are not available for permanent service even of a temporary duration, as chairman.

I find in the list of industrial research laboratories of the [fol. 7742] United States appearing in this bulletin, the Bell Telephone Laboratories, Inc., and many other concerns.

Without having looked over this long list of industrial research laboratories, I would say that I think they are in three categories; they are the research and development laboratories of industrial concerns, manufacturing business, operating business for private corporations; they are the research laboratories maintained by associations of industries who do not maintain their own complete research laboratories but who have a sufficient interest in common fundamental problems and associate themselves together in the maintenance of a research and development laboratory, which does for the industry all fundamental problems with which our laboratory, for instance, does for us, such examples as the laboratory of the Tanners Industry and of the Canning industry, who I think are probably in here, and also I think in this list probably are industrial research laboratories which are maintained in the research field in much the same way that consulting engineering groups operate in the engineering field. They are research labora-

tories fully equipped either in the general field of science or in specialized fields which undertake to do for clients and for a fee, problems which are submitted to them and in addition, although I think that there are probably listed in this grouping institutions like the Mellon Institute in Pittsburgh, which is a privately endowed research laboratory, which will undertake to provide facilities in which the public in general, industries or individuals can maintain research men at their own expense to conduct specialized investigations.

I presume also that we would find in this list such national and state organizations as the Bureau of Standards.

On one of the pages, 27, ending on page 28, is given what I take it, to be a general summary of the work of the Bell Telephone Laboratories, Inc.

So far as I recollect, I had nothing personally to do with the thing. I was not at the time that this list was gotten out, officially connected with it. I will have to go back and qualify that statement back there. When I said I was not officially connected with it, I said somewhere that I was not officially connected with the National Research Council at the present time; as a matter of fact, that is not so; I am one of the members of the Engineering Division. So far [fol. 7743] as I know, I had nothing whatever to do with this statement. It does describe the activities of the Bell Telephone Laboratories, Inc., as accurately as one can describe in a brief summary form, merely by listing a large number of things in which a laboratory such as ours would be engaged.

The book to which we have been referring is the bulletin of the National Research Council, No. 81, Industrial Research Laboratories of the United States, including consulting research laboratories, 4th edition, compiled by Clarence J. West and Callie Hull. Published by the National Research Council of the National Academy of Sciences, Washington, D. C., 1931. This is a reliable official publication of that organization. There has been given here many manufacturing corporations that have laboratories and I am assuming that their activities are described in a general way at least properly. The activities of the Bell Laboratories, Inc., and the activities of organizations doing laboratory and research work for these various manufacturing concerns as to methods differ not at all from the larger and more efficient research laboratories. In so far as that list

may contain small organizations which are sailing under the name of research and development laboratories they probably differ very much with regard to method and the care which they exercise and the extent to which they go in the study of problems.

As to field, of course, our laboratory differs from probably every other one that is listed in that pamphlet in that our work is confined generally to the field of alternating phenomena whether on materials or sounds and to those adjunct fields which are,—where it is necessary for us to have first-hand and fundamental information as it may apply to the scope of our business.

Q. 182. But generally speaking, doctor, wouldn't you say that these manufacturing concerns that have laboratories such as listed in this official publication of the National Research Council, are engaged in the work in connection with those concerns, of improving their product or their service in reducing costs of production, in developing new fields of application, in developing and availing themselves of by-products and materials, and in developing new products and doing those general things. Would you say that?

Mr. Blackman: I am going to object to that as irrelevant and immaterial, and no foundation for the witness' knowl- [fol. 7744] edge of what the other manufacturers do. I don't want to interfere with anything within reason, but I think that is getting a little beyond.

Mr. Haight: Do you want the doctor to answer the question?

Mr. Blackman: If you want him to.

Generally speaking, these manufacturing concerns that have laboratories, such as listed in this official publication of the National Research Council, are engaged in the work in connection with those concerns, of improving their product or their service, in reducing costs of production, in developing new fields of application, in developing and availing themselves of by-products and materials, and in developing new products and doing those general things, as far as the organizations enumerated in this list relate to the larger organizations or the more substantial associations of organizations.

I would make the qualification, without having examined the list in intimate detail, but from my general knowledge

of research organizations or things alleged to be research organizations in this country, that as regards the smaller of the organizations, there will probably be found a considerable number which operate under the title of research laboratories which are not, in fact, as I understand them, research laboratories. As a matter of fact, there may be listed in that large number in that book things which are designated as research organizations which are not conducting research in the field of physical or chemical science, or, we will call it the field of physical and chemical science, but really are organizations which are operating in the field of business exploitation. I may be wrong as to that last, but certainly there have been in recent years organizations in this country which were known, and organizations connected with some of the larger groupings which were known as research laboratories which had nothing whatever to do with the things which were involved in your question except in so far as they tended to amplify the business of the company.

I am familiar in a broad way with the research and development laboratory work done by such concerns as Du Pont, General Electric and Westinghouse Electric.

Q. 185. With respect to those manufacturing concerns, what is the difference,—of course it is in a different field, but broadly as to character, what is the difference between work [fol. 7745] done by the Bell Telephone Laboratories or the Department of Development and Research of the A. T. & T. Company from the work done by and for those manufacturing concerns, by their own laboratory?

Mr. Blackman: I object to that as irrelevant, immaterial and incompetent, and no foundation *laid for the witness'* knowledge as to the details of the operations of other research organizations.

In one very important particular I would say that the work of our research organizations, and I use the words "research organization" because, as I testified yesterday, the Department of Development and Research, A. T. & T., and Bell Telephone Laboratories in their operations are essentially one thing. I will say that in one important particular this research organization of ours is unique and without any corresponding parallel in any other industry that I know of in that our primary function and the thing which is the guiding and impelling motive for our work is

the development of the art and operation for the electrical communication business, is not primarily the development of physical things except in so far as those physical things are a factor in the giving of a better, cheaper and more extensive telephone and telegraph, generally, communication service in the electrical field to the people of the United States, and every act which we do in our broadest and most general function is viewed against the necessity of the operating units of our business and not against the operations of a manufacturing organization. We are not primarily seeking to develop things to sell to an ultimate consumer. What we are attempting to do is to develop a service to be sold to an ultimate consumer and the manufacturing side of the business and the work of the research organization which touches on that side is an incident to the main objective and not the primary, impelling force back of that organization. In practically all other research organizations with which I am at all acquainted, the primary object is the development of things, in the case of manufacturing organizations such as those you have mentioned, or the development of uses of things which others have developed in the conduct of one business, but in no other organization either in this country or elsewhere in the world do I know of an organization like the research organization of the Bell Sys-
[fol. 7746] tem, where the impelling motive for the vast majority of our work is the development of a service to be sold, with nothing else incident to it. It is a very vast and very fundamental difference, as I see it.

Mr. Haight: In order that what we have been talking about may be identified, I will offer on the record the bulletin of the National Research Council as Defendants' Deposition Exhibit No. 2, of this date.

Mr. Blackman: I object to that as irrelevant and immaterial.

(Bulletin marked Defendants' Deposition Exhibit No. 2.)

Attention was called to an article by myself appearing in the Bell System Technical Journal of January, 1930. I notice at the end an author's note which says:

"The authors wish to acknowledge their indebtedness to a large number of members of the organization for their assistance in the preparation of this paper. It is impracticable to mention all who have been of assistance, but they wish to express their appreciation particularly to Messrs.

O. B. Blackwell, W. E. Farnham, W. H. Harden, H. S. Osborne and W. A. Stevens."

O. B. Blackwell therein referred to is one of my assistants as head of the Transmission Development Department—Engineer of Transmission.

In general, the acknowledgment was made for assistance in the getting together of material for us and in the general scrutiny of the thing. Blackwell's stuff is easy enough to pick out. As I remember it, I surmise that Blackwell had part in connection with cable plant, his work relating to transmission over cables, probably in connection with toll service,—both long and short toll service in so far as they relate to transmission matters. The same with regard to long distance service, so far as it relates to transmission. The same there with regard to open wire and carrier circuits, parts which may have to do with equipment details or with methods of operation, probably not.

Toll cables, certainly, in so far as they relate to transmission.

I surmise that probably Blackwell may have given us assistance with regard to maintenance of toll service in so far as the article may have related to the fundamental requirements which underlie maintenance, being the transmission [fol. 7747] engineer; in regard to international connections, certainly—all of this foreign stuff, connections to Europe, connections to South America.

He gave us assistance presumably in connection with telephone circuits provided for private use in so far as they relate to transmission or to the multiplexing of telephone lines for telegraph use; the transmission side of telephone networks for program transmission in radio broadcast; telephony in connection with air craft operation, ship-to-shore telephony, the transmission side of electrical transmission of pictures, the fixing up of the lines, telephony to other mobile stations, telephone public address systems, and the line side transmission side of anything having to do with experiments on television.

R. W. King is the assistant technical representative in my department, resident in London.

There is an article appearing in Bell Telephone Quarterly for October, 1928, entitled "By-Products of Telephone Research," by R. W. King, which begins on page 304 of that publication and ends on page 312. At the time this article was written, Mr. King was not in my department. He was

in the Information Department at that time, although some years previous to that he had been in my department, and he came back to my department for this service abroad. I would have to read this article. Will do that and put answer on the record later.

Referring to the article which appears in the Bell Telephone Quarterly of April, 1924, beginning on page 65 and ending on page 75, by R. W. King and G. W. Southworth, I agree with the following:

"Research helps to give not only better service at a reduced cost to those who use the telephone but also increases the variety of services offered. It is important, therefore, not only to the executives of the System but to the telephone user because it assures him the best service our knowledge of natural laws makes possible. It furthermore safeguards the investor and assures him that those spending his money have the broadest view of what science holds in store and that, as new discoveries are made, they will be woven into the plant, which his money has built, with the maximum of efficiency and economy and in such a way as to yield the best returns.

There are several methods of depicting a corporation's [fol. 7748] business and financial standing. One of these, and perhaps the one most usually appealed to, is the balance sheet. But the balance sheet tells of the past while research forecasts the future; and the Bell System, while proud of its balance sheet, faces the problems and opportunities of the future with the largest research development staff in the world, with a successful record of achievement behind it."

The next article appears in the Bell Telephone Quarterly issue of July, 1928, an article by myself. I agree with the first two paragraphs, as follows:

"The Telephone Switchboard—50 Years of History."

"Reduced to its fundamentals the physical plant of that vast thing we designate as the 'telephone system' centers about three elements, namely, the subscriber's substation apparatus with its transmitter and receiver for projecting and receiving sound and its bell or other signaling apparatus for attracting his attention; the wires or other transmission channels which serve to carry the electrical impulses to and from the subscriber's equipment, and the switchboard which serves to interconnect the subscribers' equipments in

any desired manner at any desired time and at the behest of users.

The innumerable multitude of intricate physical things involved in the make-up of the modern telephone plant are merely adjuncts required to insure the proper functioning of one or other of these elements. The widespread and far-reaching activities of manufacture and supply incident to the telephone business are merely the means by which we provide these fundamental elements in the quantities at the times and in the places required by the demands of the great telephone using public."

And turning to the next page (150) it continues:

"The hundreds of thousands of men and women who spend their lives in the telephone service are in the last analysis the providers, maintainers and operators of these three essential elements."

With respect to the next article which is one appearing in the Bell Telephone Quarterly issue of January, 1929, which begins on page 9 and concludes on page 24 and is entitled "Standardization in the Bell System," signed by H. S. Osborne, one of the engineers in the Department of Opera-
[fol. 7749] tion and Engineering, I will be very glad to read it.

I will also read the next article, one appearing in the Bell System Technical Journal of October, 1925, beginning with page 545, entitled "Engineering Planning for Manufacture," by G. A. Pennock. The part within the pencil lines on page 545 and the part on page 552 and ending on page 554.

Appearing in the Western Electric News of November, 1929, is an excerpt from an article which is entitled "Europe to America by Cable," and is supposed to be excerpts from an interview with the chief of the Bell Telephone Laboratories by Frank Parker Stockbridge in Popular Science Monthly and it purports to be a quotation from me, and I will read it as it appears in this article:

"Out of our laboratory," said Dr. Jewett, "have come such inventions as the Orthophonic Victrola, electrical recording of phonograph records, talking motion pictures, television, aids to the deaf, measuring apparatus for the medical profession, the artificial larynx and a host of others, all of which have resulted from our efforts to improve tele-

phone service. Many of our research men have achieved international reputation as the result of some of these by-product applications. All over the world, the names of Dr. Harvey Fletcher, Dr. Herbert E. Ives, Dr. O. E. Buckley, Dr. H. D. Arnold and others of our staff are known to scientists."

I don't remember that interview. It is true that all of those things have come out of our laboratories and it is true that some of these men like Dr. Fletcher and Dr. Ives have derived their reputation primarily because of the publicity that has been given to these so-called by-products.

Of the four it is certainly not true with regard to Dr. Arnold and Dr. Buckley, and I presume in the case of Dr. Fletcher. Dr. Fletcher outside of the communication field is known primarily because of his work in connection with the aids to the hard of hearing. He is so well known, in fact, that he has been president of the National Association of—I don't know what the exact title is,—which consists of those engaged in aids to the hard of hearing including the medical profession, and he arrived at that distinction because of the outgrowth of his work in the development of the telephone transmitters and receivers and in the meth-
[fol. 7750] ods of making measurements on which they are based. He is our leading expert on such types of equipment, that is, telephone transmitters and receivers.

By Mr. Haight: From the same article I will endeavor to read this:

"I asked him for specific examples of how problems have been tackled and solved under his direction.

"'A good example is the research which resulted in substituting electrolytic iron dust for bundles of soft iron wire as a core for telephone loading coils,' he said. For years we had to maintain an enormous wire drawing plant, using diamond dies to draw the iron wire. The cores were expensive and difficult to make. A young man named Buckner Speed came to me with the suggestion that cores could be made of electrolytic iron dust, highly compressed, if some way were found to insulate each dust particle so as to get the same effect as a bundle of wires. I authorized work to be done on this problem with the result that an iron dust type of core electrically much better than the iron wire core, was evolved in the laboratory. That was one of the first improvements on the loading coils invented by Professor

Michael Pupin and developed commercially in our laboratory. And the Pupin coil, in turn, was the beginning of long distance telephony. By 'loading' the telephone circuit with inductance coils spaced at proper distances apart, the distortion and losses of the impulses in the wire are corrected. Professor Pupin worked out an engineering method for doing this and patented it. We bought his patent and turned over to Dr. G. A. Campbell and Dr. E. H. Colpitts the task of finding out how to make coils of high inductance, low energy loss and low cost and how to install and maintain them on telephone lines in accordance with Pupin's rule. They did a really brilliant piece of research involving the need of devising new types of measuring instruments. That work has been going on for many years with increasing results."

Answer. "That is substantially part of the thing I testified to this morning."

There is one thing that I was quoted as having said there that I certainly would not say now and that is the reference to the beginning of long distance telephony. That depends entirely on what your definition is of long distance telephony, because at the time of the loading coil, they were already [fol. 7751] talking many miles over circuits. It depends entirely on what you mean by long distance telephony. Its meaning has lengthened as the years have gone on.

Referring to an article entitled, "The Day's New Marvel," "Talking Movies Talk and Move Most Naturally in Western Electric's Latest Development," in the issue of June, 1926, of the Western Electric News, page 19, which reads as follows:

"The system represents successful combination and conversion to motion picture use of three major research developments.

"The first of these is the electrical system of recording. This method employs a high quality microphone of an improved type, electrical amplifying apparatus, and a record cutting mechanism. Recording may be carried on at considerable distance from the source of sound so that the actors may be grouped naturally in any scene and need not be crowded before a microphone.

"The second essential feature is a remarkable electrical reproducer which converts the movements of a needle in the grooves of a sound record into electrical vibrations. The

electrical currents from this device pass into an amplifier and then operate a high quality loud speaker of an improved type, capable of filling practically any motion picture auditorium.

"The third development is the link between the reproducer and the audience in a theatre. An adaptation of the public address system makes it possible to pick up electrical vibrations from the reproducer, amplify them, and by means of properly located loud speaking telephones, transform them into sound. The loudness is so regulated as to give the delusion that the source is the actors whose pictures appear on the screen. In the case of musical programs a specially constructed loud speaking telephone insures the correct volume and naturalness."

I have no quarrel with it as a general statement. I think I have testified to all the elements before.

By Mr. Haight: Dr. Jewett, there is a rather long article appearing in the Western Electric News, issue of January, 1919, entitled, "Enter Multiplex Telephony and Telegraphy," by you which purports to be as chief engineer. I would like to put that in the same category as the others that have been marked and place it on the record later. The [fol. 7752] volume is Volume 7, No. 11, for January, 1919. The next one I would like to put in the record on the same understanding. It appears in the Western Electric News, Vol. 3, No. 4, issue of June, 1914, and headed "Engineering Department of the Western Electric Company," by F. B. Jewett, assistant chief engineer, and the question will be if that is correct.

In the Bell Telephone Quarterly of the issue of October, 1922, I find an article purporting to be by O. B. Blackwell, beginning on page 12, "Notes on Radio" is its heading, and it ends on page 25. In view of its length, I would like to ask the same question as before and have the answer put on the record later, as counsel has kindly agreed in the other instances.

Mr. Blackman: Do not misunderstand me. I have not agreed that they be put on the record. I have agreed that Dr. Jewett will answer your question and that you can offer them in evidence if you desire at a later period. Really I feel that this is padding the record to such an extent that

although I like most of these articles, I may feel that I will have to object, but we will not make any technical objection to your mode of procedure. We will facilitate you all we can in getting your offer on the record of the paper, if you want it.

Mr. Haight: That will be sufficient.

I subscribe to the general statement in the marked paragraph in the Bell Telephone Quarterly issue of July, 1931, an article entitled, "The Development of the Microphone," by H. A. Frederick, presented at the Fifth Meeting of the Acoustical Society of America, Camden, N. J., May 5, 1931, as part of a symposium on microphones, page 183 thereof. I am not in position to testify as to the specific details of the work referred to as that of Wente and Crandall, as I do not identify that work, but as a general statement and under the conditions and limitations which he sets forth there I think it is a fair statement.

The material referred to is as follows:

"About 1915, the vacuum tube amplifier became a potent influence on the development of microphones for certain applications, particularly where cost was not important. It did two things, it made it feasible to use, in these applications, a microphone of low sensitivity or efficiency and it created fields of usefulness for instruments of this type. It [fol. 7753] shifted the emphasis, at least in places where low cost was not a controlling element, from a magnitude of output basis to quality or faithfulness of reproduction, uniformity and reliability. In addition, it offered possibilities of exact measurements of acoustic effects if used with a suitable microphone. This influence was almost immediately reflected in the development of a very high quality condenser microphone by Wente (Fig. 21). This instrument was developed for use in such acoustic researches and its commercial applications were developed later. The faithfulness with which it reproduced sounds over a very broad range both of frequency and intensity represented a vast improvement over the previous microphones. It was later improved by Crandall (Fig 22), has received much commercial application and is used as the transmitter of the International Reference Standard with which the volume efficiencies of all commercial telephone transmitters are compared."

In Department of Development and Research of the A. T. & T. Co., leaving out all questions of personnel, there may

have been slight changes in designation, but certainly as regards its main divisions, it is the same form of organization as I found it when I came to be its head,—and largely of the same personnel at the heads of those departments. Its general field has been the same, except as that field has been added to by new developments.

Mr. Haight: We offer in evidence an organization chart as above identified, as Defendants' Deposition Exhibit No. 3 of this date.

(For deposition of John Edward Otterson, see Abst. Vol. IV, pp. 1239-1256. For deposition of Hugh Blair-Smith, see Abst. Vol. III, pp. 849-880.)

[fol. 7754] Depositions Resumed

January 11, 1932, at 195 Broadway, New York.

THEODORE G. MILLER, for defendants.

Direct examination.

By Mr. Haight:

I reside 520 East 86th St., New York; I am vice-president A. T. & T. and have been for about two years; I have been with company since September, 1904; I have charge of Long Lines Department; I was first general manager and then vice-president; I became general manager of Long Lines some time after 1923; I have been vice-president for about two years; became general plant manager of Long Lines about 1919; prior to 1919 and from about 1913, I was division plant superintendent of Long Lines, Chicago.

Long Lines services consist of toll message and special contract, both telegraph and telephone. Special contract services are further classified as full time telegraph service, short period telegraph service, and the same thing with reference to special contract telephone service; also telephotographic service, which is in effect a message service and not a special contract service.

I now remember an additional program service for broadcasting; also, we rent wires to the Government and to aircraft operating companies in connection with aircraft operations.

We rent public utilities, power lines and oil pipe concerns a service under special contract service—loading coils and

repeaters. There is not very much of it and it is rather special.

The service of telephone circuits provided for private use in long distance service is classified as special contract. That is either full time or short period telephone service.

With respect to full time telegraph service, we rent circuits to anybody, such as press associations, brokers, banks, manufacturing concerns, government departments and aircraft operators.

As to short time telegraph service, we grant a telegraph [fol. 7755] circuit for a minimum of one hour and then in multiples of hours, covering printer and teletypewriter service. The customer may have a wire and operate it by operators or rent a machine from us.

Teletypewriter service is used both in long time and short time service, and so far as the equipment is concerned, there is no distinction between the two services. Full time is the period of eight hours per day. Full time telephone service covers a period of 24 hours a day. They are private wires. General Motors had one, but we haven't many as compared with telegraph.

Short period telephone service is where a private telephone circuit may be rented for 15 minutes every day or more at a certain period outside of the busy hours. There is, however, little of it. Brokers, manufacturers and newspapers have that sort of service.

We have telephoto-transmitting and receiving stations in several places and transmit telephotos on a message basis. There are not many such customers. The biggest single use is for newspapers. They send pictures, etc.

Program service is broadcasting chains and consists of permanent net works, temporary facilities for special occasions and pick-ups. Our two biggest customers are the National Broadcasting Company and the Columbia. The National has two chains, one of which extends to the Pacific Coast and the other as far west as Minneapolis, St. Louis and so on, and the Columbia has a big chain also which extends to the Pacific Coast.

There are other customers such as the American Broadcasting Company on the Pacific Coast. There are several broadcasting stations that are not on chains but they broadcast to other stations. One in Boston has a little network of its own running through New England. There are several similar ones but not big chain customers.

A railroad can rent a circuit just as any other customer. I am not sure whether any circuits leased from us are used in train despatching. I think most of the telephone circuits that are used for train despatching are owned by the railroad companies. Public utilities, electric power companies and pipe line companies use the service for communication with the intermediate stations regulating service in emer-
[fol. 7756] gencies.

Telephoto services comprise stations in Boston, New York, Atlanta, Cleveland, Chicago, St. Louis, and we connect also with the Pacific Company at Los Angeles and San Francisco. A map would show lines connecting them.

We have separate maps showing the National Broadcasting System and Columbia networks.

Defendant's Exhibit 13 for identification is a map at page 71 of the April, 1931, issue of Bell Telephone Quarterly, which map is contained in the article in said issue entitled "Program Transmission Networks Provided by the Bell System as of March 15, 1931." This map fairly illustrates program networks.

I know that we have reports showing what the revenues of the Long Lines Department are on the toll message business and from the special contract services. I have no reports available showing how much it is for, * * * I know what it is from the broadcasting services. I do not remember ever seeing any reports showing just what it is for the short period as distinguished from the full-time services. We have reports showing revenue on telephotographic services.

We have the toll message revenues segregated from the special contract service revenues. The revenues for telephotography, which is not a special contract service, are segregated from the special contract service revenues. The revenues from broadcasting are also segregated. There are no others. The revenues from the telegraph service are not segregated in any reports that I saw. I do not know whether it is segregated, but when we want to know we estimate what percentage it is of the special contract revenue.

In our department we are not able to separately identify the investments in Long Lines plant with respect to each class of service. We can make estimates of the proportions used in each and we have made such estimates from time to time. In making those estimates we have not segregated. We have estimated the plant,—it would be reasonable to

assume that so much was used for each one, but the plant itself has not been segregated for the accounts. There has been no segregation as to the investment of Long Lines as between toll message uses and special contract services. [fol. 7757] Mr. C. Morsack is the auditor and has charge of the books. Arrangements between Long Lines and customer with reference to special contract services are shown by written contracts. I can produce a form of contract for each service. The contract specifies the periods of the service to be furnished in the case of both telephone and telegraph special contract service. Telephotographic service is message service and is sent just like a telephone message.

There is a contract different from the special service contract covering program broadcasting. There is a form for permanent facilities and one covering temporary or recurring service. I will produce the forms of contract with respect to the different special services, including railroad forms.

The Illinois Bell gets a commission on all calls originating in its territory and they get payment for the use of trunks for all classes originating in its territory and they get a pro rate of the revenues for the plant within the City of Chicago. For special contract service they get a pro rate and also a commission. They also get a pro rate out of full time and short period telegraph service. They get paid for the plant they furnish. They furnish all the plant in the City of Chicago.

The compensation of the Illinois Bell in relation to full time and short time telegraph service is different from other cities because Illinois Bell owns the plant. There isn't any special pro rate, however. The pro rate is simply upon the value of the plant in Chicago used generally in the long distance service. It has no relation to the revenue received by the Long Lines for full time or short period telegraph service. The same applies to full and short time telephone service and as to telephotographic program and other special services.

Q. 102. Now, are any of these special services rendered direct to the user from the Long Distance tollboard or are any parts of it rendered through the exchange offices in Chicago?

Mr. Blackman: I shall have to object to this line of exam-

isnation. You are getting into a subject that is not before the court, as I understand it.

Mr. Haight: Then I do not read the opinion right. We think it has relation to the property that is used in these [fol. 7758] various offices, and it has pertinency to the matter of segregation.

Mr. Blackman: You have a right to press your question if you want, but I make my objection on the ground that it is incompetent, irrelevant and immaterial.

The special services are rendered by lines from the long distance toll board to the offices of the customer. Whether the plant which the Illinois Bell furnished for those services between our central office to the customer's offices happens to go through some of their exchanges, I don't know, but the customers do not come to our central office to get their special service, it is taken at their premises. Special wires, for instance, go through a loop furnished by the Illinois Bell to the long distance tollboard, from the customer's premises. Telegraph service both full time and short period are handled in the same way. These loops may go through the exchange boards first. The full time telephone and short period telephone are handled in the same way as telegraph services. They carry direct to the customer. They terminate in the customer's premises. The cables from the customer's premises in many cases are operated through the exchange offices but the loops are routed direct from the tollboard to the customer's premises. The same is true with reference to program service.

The billing for these special contract services is direct from Long Lines to the customer.

As to teletypewriters used by the customer in these different services, they are leased to the customer and in many cases the associated company owns, furnishes and maintains them. In Chicago the Illinois Bell owns the teletypewriters. That is true with reference to the equipment used in other special services.

The broadcasting companies own their own stations. I think some of the broadcasting equipment is bought from the Western Electric. Some of the press associations own their teletypewriting machines, but not all of them. Long Lines or associated companies own them and they are furnished under a contract.

Teletypewriters used by broadcasting companies on their telegraph wires would be furnished by Illinois Bell in Chicago. Long Lines makes the leases but Illinois Bell furnishes the apparatus in the City of Chicago; that is, we sign [fol. 7759] the contract with the National Broadcasting Company for a net work all over the country and where teletypewriters are used in connection with their program wire, they would be furnished by the associated companies under the same arrangements as exist with respect to any kind of special service contract. In Chicago we take broker's wire or bank wires, we make a lease with the customer, but we arrange with the associated companies to provide the teletypewriters where they are required. In such cases the customer pays us and we pay the associated companies.

On special contract services the associated companies get a commission on a regular schedule basis on the revenues from the contract. That is true with reference to Chicago. The situation in Chicago is special with respect to commissions for message services. There is a regular basis for the commission which is the same on all messages while there is another schedule for the business that originates elsewhere.

Assuming that the Chicago Tribune at Chicago has special press service, the Illinois Bell would furnish the teletypewriters and there is a separate rent for the teletypewriter as distinguished from the rent for the use of the lines. The rent for the teletypewriter is paid to the Long Lines if it is in connection with a Long Lines contract. Long Lines keeps it. I could not answer whether Long Lines pays anything to Illinois Bell for the use of that instrument. I don't know whether there is any written contract with the Illinois Bell as to compensation on special contract services, but there is a schedule. Mr. Morsack may be familiar with that.

I do not think the schedules are printed but are in the form of letters. Mr. Carter ought to be familiar with those.

I know of no property in Chicago belonging to the A. T. & T. or that is used in the special contract services. There is a contract between the Western Union and the A. T. & T. under which Western Union can obtain wires to use to transmit messages, which has been in force two or three years. There is a similar contract with the Postal Telegraph & Cable Corporation for about the same time. The General Department of A. T. & T. have the custody of those contracts. Long Lines has been furnished with copies.

Long Lines publishes a magazine called Long Lines and [fol. 7760] has done so for about ten years; published each month; Harman Hocker is the editor who reports to Mr. Bood, the publicity manager. I imagine there is a complete file. I don't know whether there is any objection to defendants looking at those.

(Counsel for plaintiff stated they would advise as to whether it will be furnished.)

There was an increase in Long Lines plant between 1920 and 1930 to provide many more facilities for the increase of business. There has been a considerable increase in the various special services. The program service is all new in that period and we have had to increase the plant to provide for that service. There has been a big increase in all special services except telephotographic service, which is the smallest special service. Telegraph business is the largest one and broadcasting is the second. Special contract telephone service is third, but it does not amount to very much compared with the total business.

Our records are kept so that I could furnish the form of special services by classes for the years 1920, 1925 and 1930. I think Mr. Carter knows more about that.

Q. 187. Now, in regard to the toll message service, has there been any general trend of change in that from 1920 up to date?

Mr. Blackman: I object to that; it is irrelevant, immaterial; it is not intrastate service. I think we have gone about as far as we should.

Mr. Haight: It is interstate service in which the record already shows interstate property is used.

Mr. Blackman: Yes, that is true, but here you are going into a question purely relating to interstate business. All the Long Lines services, being interstate, of course.

Mr. Haight: Yes.

There has been an increase in the toll message service between 1920 and 1930. However, the trend lately was different from what it was in 1928 and 1929, but it increased very rapidly up until about two years ago. Since then it has been decreasing. I can furnish the amount of toll message revenue for 1920, 1925 and 1930.

There have been several decreases in the long distance message rates in the last five or six years for everything

in excess of 40 miles. Improvements in equipment or facili- [fol. 7761] ties have had bearing upon such reductions because of ability to handle business more economically thereby, such as development of repeaters, loading coils, cables, switchboards, operating methods.

Q. 201. Have there been any developments of equipments or improvements in equipment in exchange plants that have helped to increase the volume of long distance messages?

Mr. Blackman: You mean exchange plants of the local companies?

Mr. Haight: Yes.

Mr. Blackman: I object to that on the ground that I do not know that this witness is familiar with the details of that; he has not been shown to be.

Mr. Haight: I do not want him to tell us anything he does not know.

I am not competent to answer the question as to whether improvements in equipment in the exchange or local plants have had anything to do with the increase of long distance business. There has been no reductions, however, in the rates for special contract telephone and telegraph services. There have been some adjustments in the rates for printers and in connection with some broadcasting rates—minor reductions, which reductions apply really to some of the accessories rather than the main service.

The auditor of Long Lines makes reports on the financial situation to the comptroller of the A. T. & T.—income accounts. The assistant treasurer makes what we call a cash report to the treasurer. No reports are sent to the comptroller except those specified by the Interstate Commerce Commission. However, there are other reports of cash requirements and provisional estimates made from time to time. I have to do with the provisional estimates and estimated cash requirements reports sent to the comptroller, Mr. Morsack, also. I had to do also with the determination of Long Lines long distance message service rates. Our aim in fixing the rates from time to time was to get a fair return and stimulate as much business as we could by reduction in rates, and to fix a reasonable rate for long distance service. I think we have accomplished that from time to time with these various changes in rates.

The Eastern Telephone & Telegraph Company was

bought by the A. T. & T. and operates in Nova Scotia and [fol. 7762] New Brunswick under a franchise from the Canadian Parliament to construct lines through Canada, and it was purchased to get rights to build a line through Nova Scotia and New Brunswick and for the purpose of connecting it with the transatlantic cable from Newfoundland to England, and it will be by that means that Long Lines will furnish transatlantic cable service.

The Transpacific Company operates the Pacific Coast radio station which now gives a service to Honolulu.

There are a lot of different companies that hold title to Long Lines property, there being one in the majority of the states, one in Illinois. There are probably about thirty of these different companies.

Our engineer, Mr. Pilliod, can give a better idea of what provisions have been made for future developments and increase in Long Lines. He has fundamental plans for providing facilities over different routes and for providing new routes. We have a pretty general picture of the future for about five years. We have had computed for each year the return on investment in Long Lines. Mr. Morsack probably has those records.

Long Lines has a separate headquarters from the A. T. & T. at 15 Dey street, but since 1920 Long Lines has occupied space in the A. T. & T. Building at 195 Broadway, and still occupies space, but it is very little.

The organization chart of Long Lines has been practically the same with slight changes only since 1919. I will produce an organization chart.

I will check up the map appearing on page 69 of Bell System Technical Journal for January, 1930, which map is in connection with the article by Gherardi and Dr. Jewett and is entitled "Special Contract Telegraph Service Furnished to the Press Association Circuits Totaling 24,000 Kilometers are Used Exclusively by the Press Association for Distributing News to Its Customers"; also the map appearing on page 70 of the same publication, being Fig. 55, "Special Contract Telephone Circuits Furnished to a Brokerage Company, 30 Circuits Totaling 38,000 Kilometers with 95 Stations." Also map or illustration on page 73, same publication, above the legend "56" and the words "Routes of Bell System Telephoto Service in the United States."

(The said pages of said publications were marked for [fol. 7763] identification as Exhibits 14, 15 and 16, respectively.)

I will check up the article appearing on page 83 in Bell Telephone Quarterly, April, 1930, entitled "Transoceanic Telegraph Service, General Aspects of," written by me.

CAJETAN MORSACK, for defendants.

Direct examination.

By Mr. Haight:

I reside at West Orange, New Jersey; I am auditor of Long Lines Department, A. T. & T. and have been since spring of 1922.

The business of Long Lines is classified in the accounts into message tolls, special contract service, and telephoto and broadcasting. In general the telegraph service is kept distinct from the telephone service.

I can give information as to the revenues relating to the business as to long and short period telegraph service, full and short period telephone service, telephotographic and program service. We distinguish between telephone and telegraph service. Telephoto is separate. We have certain subdivisions of telegraph service, also. There is a segregation of private wire telephone service. Probably the teletypewriter service can be distinguished. The teletypewriter account covers the revenues derived from special contract services conducted by teletypewriter. I can produce an accurate listing of all those things, and will do so.

Reports of revenues are made by Long Lines to the Comptroller and by the Comptroller I mean the General Department of the A. T. & T. monthly and cover financial results of Long Lines. I could furnish those reports. The forms include balance sheet, income statement, revenues, expenses and analyses of those major statements which appear on other reports. It would take a few minutes to get a set of forms of reports, which I will obtain.

I will produce an organization chart that will illustrate the organization of Long Lines back as early as 1923.

The general treasurer of the A. T. & T. is compensated through the apportionment of charges against Long Lines for general services, which charges amount to 1½ per cent

[fol. 7764] Long Lines revenue. There is nothing in addition to that for general services.

There is an assistant treasurer of A. T. & T. who is part of the Long Lines organization. I don't think there is any employe on Long Lines payroll that is also on the payroll of General Department. The publicity manager in the General Department is not also the publicity manager of Long Lines.

The Long Lines attorney, Mr. Elsasser, is counsel for Long Lines. He has an organization reporting to him. The general counsel of the A. T. & T. does not appear as part of the organization of Long Lines, nor does the tax attorney. However, I don't believe I am competent to answer the relation between Long Lines and the tax attorney and general counsel. The only way I have of knowing whether any one is in our organization is by the payroll. I determine whether any one is in the Long Lines organization by whether that man is paid by the Long Lines.

Our reports include the revenues from special contract service that originate in Chicago, but that revenue is not segregated and it would be very difficult to say where it originates, because there are a number of points involved, any one of which might be considered as the originating point. Obviously we could segregate special contract revenues originating in Chicago, because it is the amount billed on those particular contracts. Only in the sense that the amounts of compensation which the Illinois Bell receives for services and facilities that they furnish in the City of Chicago are apportioned among the accounts, certain amount to special contract service revenue, certain amount to message toll business, to broadcasting, can the revenues attributable to Chicago be segregated. For instance, with reference to the National Broadcasting Company, there are several localities involved in the hookups, one being Chicago. To segregate and attribute to Chicago any portion of such revenues could be done only on an arbitrary basis, and there is no segregation except as I have explained, namely, that the total compensation to Illinois Bell is apportioned to various revenue accounts as pro rate reduction. I can think of no billing made by Long Lines to the Illinois Bell on account of special services.

With respect to special services rendered by Long Lines in Chicago, we make a settlement for the plant and serv-
[fol. 7765] ices furnished by Illinois Bell there, and also we

make a settlement with Illinois Bell for the amount of commissions on special contract services. I think Illinois Bell gets payment for the loop in connection with private wire service, and the amount of the payment is what the Illinois Bell would receive from a similar loop furnished to an outsider. I don't know how much that is. I think I can find out, but I am not sure; what is running through my mind is whether it is the same in all cases. In addition to the payment for the loop, it also gets a commission. I don't mean that the commission represents compensation for the use of the toll plant but what I do mean is that Illinois Bell gets a percentage or share of the revenue which is paid to the associated companies on two-way special contract services, which commission is calculated on the regular commission table depending upon the amount of revenue and contract. There is a schedule covering it. I am speaking of all two-way special contract services. I don't know whether there is a contract but there is at least an exchange of letters. I will get the exact basis and (subject to consent of counsel for the plaintiffs) produce same, so far as it relates to the Illinois Bell in the Chicago business.

The system of paying commissions on special contract service started in July, 1930. Prior to that time no commission was paid at Chicago or at any other point. Prior to that, the Associated Companies were paid for special loops that were used and also a pro rata share for the line haul furnished, which is true at the present time.

In regard to the article in the Bell Telephone Quarterly for April, 1924, written by me, at page 500, describing the accounting system in the Long Lines, I will read the article and advise you whether it correctly described the accounting system at that time and whether such description holds true at the present time.

Mr. Haight: I think at this time the various forms of reports that were asked for have been brought into the room at the direction of the witness and then placed in the possession of counsel for plaintiff. What is your position?

Mr. Blackman: As to allowing you to see these forms, why, we will do that. We have already furnished you with these complete forms and every one of them; you have had all of them in your possession and have had them for many weeks. [fol. 7766] As to permitting these forms to be marked for

in evidence in this case, why, we may have objections to the offer, but so far as seeing them, why, you can see them.

It was agreed by counsel for plaintiff that defendant's counsel would be advised without delay whether pursuant to defendant's demand:

(1) Monthly reports, Long Lines, Nos. 1, 2 and 14, covering the month of December for each of the years 1919 to 1930, both inclusive, will be produced.

(2) Monthly reports, Long Lines, Nos. 1-A, 3, 4, 7, 11, 18, 22-A, 22-B, and 22-C for each of the years 1919 to 1930, both inclusive, will be produced. December monthly reports may be sufficient if that report covers pending months of each year.

(3) Provisional estimates, Long Lines, reviewed by report 22-B from 1919-30, both inclusive, will be produced.

Article entitled "Accounting in the Long Lines Department"—Bell Telephone Quarterly, April 1924, being Defendants' Exhibit 17 offered and received in evidence. That article was written by me, is correct as of the time it was written and as of today, except there have been certain minor changes and one major item change effective January 1, 1932. As to the latter, all the field accounting forces formerly part of the Plant Department have become part of the Accounting Department. The minor changes are of no particular importance.

Up to the end of 1927, the license payments by Long Lines were computed only upon the toll message business. Since that time the computation has been made by taking a percentage of the total revenue of Long Lines less uncollectibles, including telegraph business, all special contract services—total operating revenues.

We compute the return on the investment of the Long Lines Department, as a whole, for all years in the regular course of business for the officials of the company, that is, all the administrative people of the Long Lines Department and for transmittal to the comptroller. Those computations have been preserved and are on these monthly reports. I think Nos. 1 and 22 are the only ones which show that. I do not think any of these reports actually show the computations in the form in which they were computed. This 22-B, for example, shows total telephone earning to aver- [fol. 7767] age plant in service. If we look at 22-A and B

we may get an answer to the question as to each year, the question being what were the telephone earnings on average plant in service.

By "average plant in service," we do not include construction work in progress.

Cross-examination.

By Mr. Blackman:

So far as I can remember, the tax attorney and the general counsel of A. T. & T. were not on the Long Lines payroll, but each of the officers had a force engaged on Long Line work and they were on the Long Line payroll. Mr. Elsasser reports to Mr. Miller not to Mr. Bracelen but at that time this organization chart shows a report to the general counsel. When that was in effect, while the general counsel was not on the Long Lines payroll, a certain force under him was on the Long Lines payroll and paid by the Long Lines and charged to the Long Lines account.

The assistant treasurer A. T. & T. is on the Long Lines payroll and reports to the vice president, his entire salary being paid by Long Lines. Long Lines has a complete organization of its own and pays it own people.

James J. Pilliod, for defendants.

Direct examination.

By Mr. Haight:

Reside New York City; engineer of Long Lines Department since January, 1920; graduated in electrical engineering, Ohio Northern University, in 1908; have been with A. T. & T. practically ever since; with them somewhat before that date.

I will read the article, Bell Telephone Quarterly, January 1923, entitled "Engineering on Long Lines," p. 18, written by me, but my recollection now is that it sets forth the situation at that time, and since the changes have been principally in personnel. Different problems have been presented on account of activities in radio field, for instance. Fundamentally, the engineering problems are not changed. It is merely new additional things brought in, but it is a new branch of our activities. A great deal of it is merely an extension of the older art, gradually merging from the old art into the

[fol. 7768] new. Some changes, however, have been required to be made on account of radio broadcasting.

Our general telephone circuits are all designed for 2-way operations, that is, communication between two telephone instruments one in one location and one in another. The radio broadcast is fundamentally a 1-way transmission service. However, there are occasions when they do 2-way service.

In broadcasting circuits we have a great many stations connected to the same circuit, which is quite different than in the case of telephone circuits where generally you have only two instruments. To that extent it is a slightly different art. However, the same kind of copper wires with necessary modifications are used. Special circuits have been required as any change you might make in a fundamental business requires special attention or special apparatus.

The use of teletypewriter has been developed over a number of years and is one added feature to our activities. They do not in themselves require any fundamental changes, however. Teletypewriter is an instrument to connect on to the end of the telegraph circuit, and the change is really from the telegraph instrument to the teletypewriter instrument. The tendency has been to work at considerably higher speeds with the teletypewriter than was possible by hand operation, which has required an improvement to some extent in the telegraph circuits themselves, to the apparatus connected to those circuits, which has required the replacing of some of the older type of apparatus that might have been suitable for hand speed.

The teletypewriter Private Branch Exchange systems is a board which can be used for terminating a number of circuits to which are connected teletypewriter machines and also telegraph lines to other points either in another city or in the same city. This board is so arranged that the different teletypewriter stations can be connected either to each other or to the line extending out from the switchboard. In Long Lines in the last few years there have been a number of different developments to make the service more efficient and economical to operate; carrier telegraph systems, improvements in methods of operating telegraph service in cables, there have been new telegraph circuits devised; all such have been directed to better and cheaper

[fol. 7769] service. The carrier telegraph system enables us to operate possibly ten telegraph circuits over one pair of wires and to operate telegraph circuits in cables more efficiently.

* * * * * * *

[fol. 7770] HARRY H. CARTER, for defendants.

Direct examination.

By Mr. Haight:

I reside at Pelham, New York; I am general commercial manager of Long Lines and have been connected with Long Lines for about four and one-half years.

So far as I can see, the organization chart handed me as of July 1, 1927, is the organization chart for that year. Except for personnel, it has been the same since, except we have added some field officers at Washington and Detroit, and there has been added also since, a general sales manager. I will produce a later organization chart.

The general commercial representative is not in existence any more. The general sales manager has taken over part of the function that was performed by the general commercial representative and the other parts go to the general commercial supervisor. The general sales manager directs the selling force of the department, makes studies in his section as to market conditions, where the service can be sold, and does the general line of work that a general sales head would do, etc. He has 12 or 14 people on his staff and those engaged in selling are at the present time around 90, which covers the eight or nine field offices, as well as New York.

There is a commercial engineer in the Long Lines who has about 125 under him. He makes estimates of business, makes studies about charges, rates, tariffs and so on. He has to do with the toll rates. They keep data as to the volume of traffic by length of hauls. He has also to do with special service contracts, with developments and rates in connection with those services. I don't think he has anything to do with any commission cases.

The work of the General Toll Development Supervisor would come now under sales manager. Part of the work originally handled by manager of auxiliary services is [fol. 7771] done now by Program Supply Manager and part now by the Commercial Supervisor. The Program Man-

ager handles contacts with broadcasting companies. He has four or five people under him.

In the Commercial Supervisor's section there is the pricing branch for the facilities that the broadcasters desire.

I heard the classification of special contract services given by Mr. Miller, which is true except that the short period telegraph service is confined to teletypewriter service but not to Morse.

I have under me as General Manager about 350 to 360 people.

The Illinois Bell does some sales work with respect to special contract services, being able to close a sale for any of those services, that is, they handle the applicant for service, negotiate for the sale of the service, and the Illinois Bell does that work. If the Illinois Bell is in touch with the customer who desires service from Chicago to New York, as an example, it is in a position to take that contract for that service. In Chicago our own department and Illinois Bell sells special contract services. Likewise the Western Electric, when it was in touch with anybody that wanted our service, would be able to make the sale, because we are engaged in an employees sales campaign, Illinois Bell selling for us and we are selling for them. The Western Electric has entered the campaign.

Long Lines has an office in Chicago handling the selling of toll and special contract services. It is known as the Chicago division of Long Lines. It is a branch of the Long Lines Department like our New York, Washington or Cleveland offices.

I will look up and let you know on whose payroll the employes of the Long Lines are in Chicago. There are possibly 30 or 35 persons in Chicago in the Long Lines Department selling special contract services and long distance toll service for the Long Lines. I have no way of telling how much of the work is long distance toll service and how much is special contract service. Illinois Bell has in its organization what is known as toll and special contract force. I don't know the size of it. There are no regular reports of the efforts of those persons in the Illi-
[fol. 7772] nois Bell doing that work. However, the division office of Long Lines at Chicago has a record of the sales. There is a report to the Long Lines Department

at New York City of the total sales, but that report does not divide the sales made by the Chicago division of Long Lines and those made by Illinois Bell. I have no way of distinguishing what was sold by one or the other. I could go back to the division offices in Chicago and get a division of the sales betwen Long Lines and Illinois Bell. I have never done it, though.

I made some mention of the Western Electric in connection with the selling of services of Long Lines in Chicago. With respect to that, all the Bell System forces are engaged in an employes sales campaign, so-called. In Chicago I assume the Western Electric people, Illinois Bell people and all their forces like Long Lines, are engaged in this and are trying to sell any of the Bell System services, including Long Lines, in Illinois, that can be sold. I know, however, of no specific organization in the Western Electric so engaged.

The Chicago office of Long Lines Department does work outside of Chicago of various kinds; it covers northwestern territory and the mountain states. The headquarters are out of Omaha, Minneapolis, Fargo, North Dakota, and Denver, and runs right up to the Canadian line, and all the group of states made up of the Mountain States Telephone Company territory.

Generally speaking, I assume that Chicago covers the center part of the City of Chicago, and they are in position like every other employe to sell services whether it is there or in the state or any part of the country. When the employers of the Illinois Bell are in a position to take an order for the furnishing of services and facilities that are available, including program service, they quote the the rate for the facilities. There is a continuing program supply furnished after the sale is made in the case of program service. I think both Illinois Bell and Long Lines furnish that service. The Long Lines have some continuing services in Chicago.

The National Broadcasting Company network and the Columbia network both have stations in Chicago broad- [fol. 7773] casting programs daily. I could get the information as to amount of the service rendered by the Illinois Bell in Chicago and as to that service rendered by the Long Lines; that is, how many stations are on the air daily that are hooked up with Long Lines and how many

are on the air daily connected with Illinois Bell networks. I will get that information.

I should say that the same amount of that sort of service would be given by the Illinois Bell on a 16-hour continuing service that would be given by the Long Lines on a comparable service. Illinois Bell sales forces sell telephotographic service as another form of service that we offer. There is very little sold by either. Newspapers and picture companies employ that service. But there are no contracts for that service as it is on the basis of a toll message service. A high percentage of the full time telegraph service would have been sold by the Long Lines force.

Morse service is not used to any great extent by the Associated Companies. If it is a Morse service, it requires a rather expert man on Morse. We have them in our department but I doubt if Illinois Bell has, or a teletypewriter man in their department.

Illinois Bell, as to short period telegraph service, using the teletypewriter, would have the same to do with the sale of that service, as they would have in selling the full time service. I don't think they have men who devote their time to that exclusively. It is one of the several services their salesmen have to offer. The same activities with reference to sales apply to the sale of special contract telephone services both long time and short time.

Prior to 1930, the Illinois Bell received for making sales of Long Lines special services, their regular charges for the facilities involved, without any commission. But for about a year and a half or two years it has received a commission. I will supply that date when the commissions started. It was figured out on the same basis as the commission paid on toll. I think there was an interchange of letters covering the amount of the commission, which I will produce. No compensation was paid by Long Lines Department to the employes of the Illinois Bell for selling special contract services of Long Lines. As far as I [fol. 7774] know, these employes got their salaries from Illinois Bell.

With respect to the special sales campaign, the employes in the system have been asked to do all they could to promote the various services of the system—exchange, toll, special service and what not, so that any employe in any department at any place in the United States is informed

as to the several services we sell and they are in a position to intelligently discuss those services and close sales if the opportunity presents itself.

As far as I know, there are no special rewards for results in selling. The campaign has been running for probably two years. I think the campaign was originally suggested by several of the associated companies. I don't know to whom the suggestion was made, they just started it around and got some results. Several of the associated companies involved have been directing the campaign. I suppose the O. & E. department, A. T. & T. is used for advice and consulting purposes in connection with that activity, like they would be in connection with all other sales activities. By O. & E. I mean the operation and engineering department of the A. T. & T.

The Long Lines in connection with that campaign furnished certain information as to special and toll services; that is, generally how the services were being used, who had purchased them and how they were being made use of by the customers. The A. T. & T. division of Long Lines in Chicago participated in the campaign and were asked by the Illinois Bell people to help them sell their services like they were helping us sell our services. The campaign is a part only of the general selling work. It merely brings in more employes that we would nominally have selling the services and our force in Chicago continued selling special services as they had in the past. There was no special advertising in connection with the campaign, but amounted to merely a further number of people put on the job of selling service.

I am the one to give instructions in respect to selling of Long Lines service, message or special, but I gave no instructions in regard to this selling campaign.

When the Illinois Bell makes a sale of special contract services of the Long Lines, the Long Lines bills the cus- [fol. 7775] tomer and that is done continuously by Long Lines.

The Illinois Bell with respect to broadcasting operates the facilities in Chicago to see that they are working properly each day that the program is on the air. That is, the Illinois Bell maintains the instrumentalities, lines in the City of Chicago in connection with special contract services.

Mr. Charles Barnett is head of the Long Lines Division in Chicago and has been such I think about 12 or 15 years.

I don't know what the arrangement for compensation to the Illinois Bell was in respect to use of loops prior to 1930. There would be no special contract services of Long Lines in Chicago that does not use the plant of the Illinois Bell in Chicago to connect them up. Take a private wire between New York and Chicago. The customer would be sold by the Long Lines Department in New York. The service between New York and his office in Chicago and the private wire would be exclusively for the use of that customer, and a so-called loop would be used at both ends; that is, a loop in Chicago and one in New York. These loops are connected with the toll line or telegraph service between New York and Chicago. The same relates to all the different services—telegraph, telephone, full time and short time, also for the program. The telephoto is not on the special service; it is an individual message service.

Since I have been connected with the Long Lines, we have put in the short period teletypewriter service. Prior to my occupying the position of manager of commercial department, Long Lines, Mr. A. W. Drake had that position. For how long, I don't know.

I will look up and give you the information as to how many radio stations there are in Chicago area using circuits regularly. I will also give you an idea of the temporary radio service or one night stand. I know there are a great number of radio stations in Chicago and that at times some of them are put on for one night and some are on the air every night. I think there are some airports in Chicago that have special service but I would have to look that up. That is regular toll, also teletype on special contract circuits for dispatching planes and giving weather advice to pilots. I don't know the extent of any special service given to railroads at Chicago or of private wires [fol. 7776] leased to any electric power company or pipe lines or concerns of that sort. There are form contracts for the special services which I will furnish. There is one form covering permanent facilities and another form covering temporary facilities.

Defendants requested witness to furnish the revenues for the different services, including toll message for the years 1920, 1923, 1925, 1928, 1929 and 1930.

CLYDE UHRIG, for defendants.

Direct examination.

By Mr. Haight:

I reside on Manhattan Island, at 45 East 55th street. I am assistant comptroller A. T. & T. and have been for about 6 or 8 years; prior to that, I had similar duties with other titles for some years. That would take us back to 1920 or 1921.

I have before me an organization chart of the comptroller's department. (Marked Defendants' Deposition Exhibit 51, for identification.) According to that chart, I am assistant comptroller. The duties of the various divisions are broadly correctly described on that chart. My division, entitled "A. T. & T. Company, General Department of Accounts and Reports" comprises the work on the general books of the A. T. & T. general department, and also to the extent that we combine long lines balances at the end of each month and year, the books of A. T. & T. as a whole; both balance sheet accounts and revenue and expense accounts—all accounts.

The words "Special Studies in Respect of A. T. & T. Company's Accounting and Financial Matters" means largely a projection of our earnings and cash positions over 6 months to a year, in order to be in a position to advise the comptroller and others among other things of the needs for raising capital funds.

The title "Allotments to Associated Companies and Matters Relating to Acquisition of Associated Companies Securities," covers loans to associated companies usually for construction purposes and is evidenced by demand notes which we carry along and commonly exchange for [fol. 7777] common stock. Sometimes those notes and open account advances are repaid from the proceeds of bond issues of the Associated Companies.

The title "A. T. & T. Company, General Department Methods," relates to the best procedures in running an organization of 80 people which this comprises, accounting classifications, treatments and precedures, including financial, since we are very considerably involved in financial matters, loans, etc.

The "Supervisor of Methods" works with respect to

methods above mentioned. The auditor is in direct charge of the general conduct of the activities of the office.

"Supervisor of General Bookkeeping" has immediate charge of the books from which balance sheets and the income accounts are produced.

The title "General Books and Records, Real estate," relates to property in this block, 195 Broadway. However, to the extent that the work is done directly for the 195 Broadway Corporation, such costs are borne by that corporation.

The title "Tax and Commission Reports" covers the compilation of tax and commission reports, reports to the Interstate Commerce Commission, the New York Public Service Commission and various State Tax Commissions.

The "Supervisor of Disbursements" covers 100% of the disbursements of the general department, such as payrolls and disbursements under voucher authorizations.

The title "Special Assignments" covers rate case exhibits such as we have had recently at Columbus, Detroit, Chicago and so on and any other rush work which requires an exceptionally competent person. There is just one employe in that particular.

In the section "Supervisor of General Bookkeeping," there are about 30 people. They run not only the general ledgers but they draw off from those ledgers a great many reports and other data required from the books. For example, all these exhibits that Mr. Heiss has put in, come almost wholly from those books.

Under "Methods and Special Assignments" are routine bookkeeping and reporting.

"Special reports, assignments, internal audits and allot-
[fol. 7778] ments" refers to cash estimates, earnings estimates, allotment forecasts.

"General books and records" covers the actual posting to the general books and the subsidiaries.

"Employes' Stock Plans for Purchase of Stock of A. T. & T. Records and Reports" is the American Company's control of the stock plan in the various units of the Bell System as it converges up to the American Company.

"Files" refers to the filing, etc.

"Control Records and Reports" covers employes' stock plan, employes' savings plan by deductions from salary and the employes' life insurance plan; also by deductions from salary for A. T. & T.'s own employes as distinguished from System employes away from 195 Broadway.

"Payrolls and Deductions" relates to payrolls of the General Department covering 2500 odd employes.

"Vouchers" relates to payments other than payrolls to various creditors, all creditors other than employe payroll people.

"A. T. & T. Company General Department Accounts and Reports" relate to A. T. & T. Company only as distinguished from Bell System.

"Special Studies in Respect of A. T. & T. Company Accounting and Financial Matters" relates to business of A. T. & T. and very particularly its business in relation to its associated and affiliated companies. At the present time that would consist of the earnings estimate for the year 1932, what our forecasts for earnings for the coming year are,—forecast of our cash position at the end of each month through 1932. All income of whatever nature enters into such an estimate. It relates to income to be derived from Western Electric and indirectly from E. R. P. I. but we have no financial contacts with E. R. P. I. Any money represented by earnings coming to us from any source, which earnings we were entitled to, would enter into such an estimate.

Referring again to "Assistant Comptroller" and "Allotments to Associated Companies in Matters Relating to Acquisition of Associated Companies Securities," I would say that purchase of stock of an associated company by A. T. & T. technically would not be classed by us as an allot-[fol. 7779] ment in that we get a special vote to acquire this new stock and allotments which consist of the lending being covered by a special vote, the two will overlap, if you class the last which you mentioned as an allotment. That will probably be regarded as a straight purchase of stock under a special vote of the Executive Committee or Board of Directors, and would not technically be called an allotment, although the proceeds of each of those capital operations go for construction.

My division issues a great many of what we call C. R. reports which are the general run of financial statements, balance sheet of the company, earnings report, expense reports, broken down by departments.

The allotment of funds for particular purposes is determined by the associated companies. They send in at the beginning of each year, or rather at the last of each year, their forecast of their need of cash requirements for the

subsequent year. Whether those forecasts come to the comptroller or the head of the O. & E. department, or both I cannot say. They never come to me. The vote from the executive committee of the board of directors authorizing loans during the year up to a certain maximum for each company, comes to me. Until I get that vote, nothing is known in my department where any of the funds on hand are to be allocated. When the report of action by the executive committee of the board of directors or by the board of directors itself, comes to me to allot or to send to one of the associated companies certain funds, I don't know at that time how much is to be used to wash demand notes or how much is to be used towards the purchase of stock where no demand notes exist in the associated companies. However, in practice it is very rare to buy stock outright where no debt exists because that would place the associated companies in possession of surplus funds which they could not use.

When it is determined that the American Company will acquire common stock of an associated company and such associated company owes the American Company money on demand notes or open account, the American Company will originate a voucher under which a check is drawn, to buy common stock of the associated company, and the associated [fol. 7780] company, in turn, originates a voucher to use the proceeds of the sale of the common stock to pay off the notes.

We would not advance money unless we received either such a form of evidence of indebtedness or other authorized security that warranted us in our opinion to make the advance. If we purchased stock, the advance would not be classed as an allotment. Anything coming under the allotment vote of the executive committee is a loan, or an advance by way of indebtedness of the associated company to us. That would be handled through the comptroller's department, but it would not be put under the classification by allotment. My division would originate a voucher supported by a specific vote of the executive committee, if it tied into an allotment authorizing the purchase of the stock, which purchase would be approved in its legal aspects by our general counsel.

Money employed to purchase the capital stock of the associated company would come from corporate funds, but not separately kept.

The allotment vote specifies that the money would go out as loans either evidenced by demand notes or possibly carried along as an open account indebtedness. The capital stock purchases where no debt exists are not classed as coming under the allotment vote. Any other class of security that we roughly refer to as open account loan is distinguished from demand notes.

I have here a set of blanks. I recognize the first one, p. 2, of CR-1, CR-1a; CR-2 has been dropped. I recognize CR-3—balance sheet, and CR-3a. Several of these CR reports are not made up in my office but the CR series that include eight are made up in our office. CR-9 is made up in the office of the treasurer. These blanks are all comptroller's reports. These reports have various distributions among the executives. The first report CR-1 goes to the executive committee. About 90% of these reports are made up under my direction. The reports are as follows, the numbers and titles being given:

CR-1; title "Cash, Temporary Investments, Capital Stock and Convertible Bonds."

CR-1A; "Average Bank Balances for 30 days preceding——," the date to be typed in there, "With Per Cent of [fol. 7781] Total Average."

CR-3; "Balance Sheet, General Department."

CR-3A; "Bonds and Notes of, and Advances to, Associated and Other Companies."

CR-3B; "Loans Payable and Endorsed Notes."

3C; "Balance Sheet, General and Long Lines Departments Combined."

CR-4; "Earnings and Expenses for" to be followed by the period, the date.

CR-5; there is no title printed in it——

Q. 81. What is the general subject-matter, just a broad description of it will do.

A. It is stocks owned, principally.

Q. 82. Stocks owned by A. T. & T.?

A. Yes, there is a title "Investment in Associated and Other Bell System Companies."

CR-6; "Summary of Service Rolls as of" and then the date "With Changes Therein From" and then the date.

CR-7; "Estimate of Earnings and Expenses for —— —— —— Ending" and then in brackets below that "Quarterly Estimate for Dividends."

CR-8; "Estimate of Earnings and Expenses for — months ending —— — ——."

CR-9 and CR-10 were not prepared by my division.

CR-12; "Dividend Revenues for the Year Ending —— —, ——."

CR-13; "Total Advances Authorized for—and Payments thereunder for Year Ending —— —, ——."

CR-14; "Cash Statement for Month Ending"—2 sheets, and a 3rd, with the same CR number but another subject-matter; "Bank Balances."

CR-14A; "Average Return on Bank Balances and Temporary Investments."

CR-15; "Preliminary Cash Estimate."

CR-15A; 'Outline of Estimated Cash Allotments, Preliminary Cash Estimate."

CR-16; "Final Cash Estimate."

CR-16A; "Outline of Estimated Cash Allotments, Final Cash Estimate."

CR-17; "Comparison of Estimated with Actual Cash Transactions." One of those is by companies and the other [fol. 7782] by classes; there are two forms of 17.

CR-18; "Ways and Means Statement, Year —— —, ——."

CR-22; "Securities Pledged with Old Colony Trust Company."

CR-23; "General Department Expense Report for Month of —."

CR-24; "Summary of Departmental and Other Expenses."

CR-25; "Department of General Administration—Administration."

CR-27; "General Administration—Vice-President Wilson." "General Administration—General Service Bureau."

CR-29; "Department of Development and Research."

CR-30; "Department of Operation—Operation and Engineering."

CR-31; "Department of Operation—Personnel Relations."

CR-32; "Department of Operation—Benefit and Medical."

CR-33; "Department of Operation—Vice-President Cooper."

CR-34; "Comptroller's Department."
CR-35; "Treasury Department."
CR-36; "Secretary's Department."
CR-37; "Legal Department."
CR-38; "Information Department."
CR-40; "Bell Telephone Securities Company, Balance Sheet."
CR-41; "Bell Telephone Securities Income Statement."
CR-42; "Bell Telephone Securities—Analysis of Revenues and Expenses."
CR-43; "Bell Telephone Securities—Securities Owned."
CR-44; "Bell Telephone Securities—Expense Report."
CR-45; "Bell Telephone Securities—Cash Statement."
CR-46; "Bell Telephone Securities—Income Statement for— Months ending —."
CR.48; "Report of Cash Purchase Agreements for Shares of A. T. & T. Company Stock to Bell Securities Company."
CR-49; "Report on Installment Purchase Agreements for Shares of A. T. & T. Company stock to Bell Securities Company," and this CR-49 continues to deal with the foregoing report.
CR-49A; "Report on Installment Purchase Agreements for Shares of A. T. & T. Company stock to Bell Telephone [fol. 7783] Securities Company." That is a continuation. CR-49A continued "Summary of Cancellations of A. T. & T. stock under Bell Securities Purchase Plan."

CR-9 and CR-10 are not made out in my division. The treasurer makes out CR-9 and I think Mr. Saxton, another assistant comptroller, or the treasurer, probably Mr. Saxton, makes out CR-10. There are some forms which have been in existence once and become obsolete. There other reports in the comptroller's department, but these given concern my own division.

The sources upon which the different CR reports are made, which I have mentioned, are the general ledgers or the subsidiary ledgers in the comptroller's department, except, of course, the cash book, and we take the treasurer's cash book and post it into our ledger.

We do not receive monthly reports from the various licensees, the associated companies, with possibly only one exception. Mr. Saxton, assistant comptroller, receives those.

CR-14, 1st and 2nd sheets, are forms for monthly report with respect to the subject-matter stated at the tops. They would give the total statement for the year to the extent that they purport to give it by these various classifications of receipts and disbursements.

The December statement for the year would show facts as to each of those particular items for the entire year. (The reports on the 1st and 2nd sheets of CR-14 for the years 1919, 1920 and 1921 requested by defendants; also, reports on form CR-16 and CR-18 for years 1919 to 1930, both inclusive, requested by defendants.)

We do not use the word "budget" in the general department in connection with our expenses, but we estimate our expenses for the forthcoming year, and they are submitted to the president.

My division at the present is running an annual expenditure of approximately $275,000, with 80 people. As compared with 1923, the curve is up but I could not plot it for you.

I don't know of any forms of reports that used to be used and that are no longer used. I am quite sure my records would show that, if there have been any in existence corresponding to the missing numbers. I will check that and in-[fol. 7784] form you.

I am not directly concerned in the make-up of the allotment. I simply act on the amounts as voted by the committee as the maximum to loan. If, for instance, the Illinois Bell owe the American Company $10,000,000 at the beginning of the year, that would not enter into the amount of the allotment vote. The new allotment voted would be over and above the indebtedness at the beginning of the year.

(Cross-examination of Mr. Uhrig reserved by Mr. Blackman until later.)

PIERRE W. SAXTON, for defendants.

Direct examination.

By Mr. Haight:

I reside at 87 Summit Avenue, Bronxville, New York; I am an assistant comptroller of A. T. & T., and have been such since 1922. Prior to that I was in the Long Lines De-

partment for a time as auditor of the Long Lines, from 1910 on.

I am familiar with the organization chart which has been identified here as Defendants' Deposition Exhibit 51. I am the P. W. Saxton appearing thereon. My division receives the current reports of the associated companies, Long Lines, and the General Department, and combines them into Bell System reports. They also receive the provisional estimates and make a similar consolidated estimate for the Bell System.

The current reports received from the associated companies cover data from the books of the company. The same is true with respect to Long Lines. The provisional estimates are prepared annually by the associated companies and the Long Lines as to their requirements for the ensuing year,—the construction which they will undertake and revenues and expenses which they expect. As a part of the provisional estimates, we receive information as to the probable cash requirements of the various companies and Long Lines during the ensuing year. At the present time they cover a period of three years. Not all detail is given for the later years. That practice has existed for about three years. Prior to that time the period was five [fol. 7785] years, and that practice went back as far as my service with the company.

"Bell System Reports" bring together the figures reported by the various associated companies, Long Lines and general department into Bell System figures, and they are distributed to the various heads of departments and the various members of the staff organization; very few to Western Electric, perhaps two or three. There is a report as to station gain or loss which is furnished to, I believe, the president of the Western Electric, who also receives one or two of the over-all general Bell System Reports. The reason for furnishing them to Western Electric is that they ask for them. I believe the Western Electric people do get with the provisional estimate an estimate of material requirements that is summarized. The Western Electric is therefore furnished the statements which advises them as to the equipment requirements of the associated companies and of Long Lines. I don't think any of these reports go to the Long Lines.

I don't think I prepared any reports as assistant comp-

troller that go to the comptroller except in relation to the matters that I have already identified.

I am familiar in a general way with the reports made by the comptroller's department. I think the numbers run into the 90's. I have to do with making reports on those different forms. I have something to do with the report CR-10 in that it is prepared under my direction. I don't have anything to do with CR-9. I have a number of forms of reports which, generally speaking, are either consolidated reports of the Bell System Companies or reports showing comparative figures as between the various companies.

I have to do with the making up of reports in the following forms:

CR-51; Condensed Summary of Reports for—.

CR-51a; Condensed Summary of Reports for — excludes A. T. & T. Company Long Lines Department.

CR-51b; Associated Operating Companies Per Cent Balance Net Profits after preferred dividend to average common stock.

CR-51c; Bell Telephone System in United States, Earnings and Expenses.

CR-52; Associated Operating Companies, excluding A. T. [fol. 7786] & T. Company, Long Lines, Distribution of Total Net Earnings for Month of —.

CR-53; A. T. & T. Company Earnings on Capital Stock.

CR-53a; Bell Telephone System in U. S.

That refers to the interest of A. T. & T. Company in the assets of the Bell System and the value per share of A. T. & T. Company stock.

CR-54; Bell Operating Companies Comparison of Results for — Months of this year with same period last year.

CR-54a; Comparison of Results for — Months This Year for Same Period Last Year.

CR-55; Bell Operating Companies Present View for — Months as of — Compared with Actual Results.

CR-55a; Bell Operating Company's Present View for — Months as of — Compared with Actual Results for —.

CR-60; Bell Telephone System in United States, Balance Sheet — Date.

CR-61; Income Statement for Month of —.

CR-62; Telephone Operating Revenues Report for Month of —.

CR-63; Telephone Operating Expense Report for Month of —.

CR-64; Plant General Equipment and Intangible Capital Report for — Months ending —.

CR-65; Report of Station Circuits and Central Offices for Month of —.

CR-65a; Net Gain in Company Stations.

CR-65b; Report of Plant Mileage and Other Data for — Months Ending —.

CR-66; Plant and General Equipment Added, Removed or Abandoned for — Months Ending —.

CR-67; Comparison of Actual Results with — View for Months of — to —.

This report shows a comparison of the actual results of operation with the latest previous view.

CR-67a; Review of Provisional Estimate as of — Date (there are 3 sheets under that title).

CR-67b; Present View of Next Year —.

CR-71; Report on Reserves for Accrued Depreciation and for Amortization of Intangible Capital for Period Ending —.

[fol. 7787] CR-72; Report of Certain Clearing Accounts for Month of — (2 sheets).

CR-76; Statistical Units for — Months Ending —

CR-86; Unit Expenses for — Months Ending —

CR-87; Employes and Benefit Payments for Month of — (3 sheets).

CR-89; Report of Payroll Changes for Month of —

CR-90; Funded Debt — Date Bond Maturities by Years.

Those refer to A. T. & T. Company bond maturities. The entire system.

CR-91; Results of Operations by States, Annual Basis. Revenues and Expense for Average Company Stations and Percentages (2 sheets).

CR-92; Commercial Department Expense Report for Month of —

CR-94; Current Maintenance Expense Report for Month of —

CR-95; Supply Turn-Over and Gross Supply Investment per Average Company Station for Quarter Ending —

CR-96; Analysis of Charges and Credits to Account 264,

General Stable and Garage Equipment and Account 702 Stable and Garage Expense Year of —

CR-97; Statement Showing General Statistical Data for the Bell System Including Construction Items, Revenues and Expenses, etc.

Those were prepared by me or in my division under my direction.

CR-88, entitled "A. T. & T. Company Employes Stock Plan Participation by Employes of the Bell System" is prepared by Mr. Uhrig.

I will check over and see what forms, if any, were used previously that are not here and are not now used—as far back as 1923.

CR-52, entitled "Associated Operating Companies, excludes A. T. & T. Company, Long Lines, Distribution of Total Net Earnings for Month of —, 1931." relates to the various operating companies of the Bell System, excluding Long Lines, and it is made up from reports of the various companies concerned, which reports are still in existence [fol. 7788] covering many years.

I cannot say to whom CR-52 goes, but my division has a distribution list which shows where all the reports go. I think there is one also for the Comptroller's Department generally and one for each of the divisions.

Chart entitled "Distribution of July 1931, Bell Telephone System Comptroller's Report," is the distribution chart for my division, except as to CR-88, which is not prepared in my division. (Chart marked Defendants' Deposition Exhibit 52 for identification.) According to the distribution chart, various persons are to get different reports as indicated, such as directors of A. T. & T., executive committee of A. T. & T., C. P. Cooper, Vice President A. T. & T. W. S. Gifford, President A. T. & T. Mr. Cooper has charge of the accounting and finance. C. A. Heiss, Comptroller A. T. & T.; B. Hamilton, Accountant in my division; J. F. Behan, Assistant to Comptroller A. T. & T.; H. Blair Smith, Treasurer A. T. & T.; T. H. Brown, Jr., in Treasurer's Office A. T. & T.; E. J. Clark, Assistant Treasurer A. T. & T.; C. Uhrig, Assistant Comptroller A. T. & T.; J. W. Green, Auditor A. T. & T.; J. A. Nixon, Assistant Comptroller Uhrig's division; E. V. Cox, Vice President in Cooper's organization; S. L. Andrew, Chief Statistician, A. T. & T.; D. R. Belcher, Assistant Chief Statistician, A. T. & T.; P. W. Saxton, Assistant Comptroller A. T. & T.;

H. J. Brandt, Benefit and Medical Department A. T. & T.; Bancroft Gherardi, Vice President A. T. & T., O. & E. Department; R. H. Bureher, O. & E. Department A. T. & T.; E. S. Wilson, Vice President A. T. & T.; K. S. McHugh, O. & E., A. T. & T.; W. H. Harrison, O. & E., A. T. & T.; E. S. Bloom, President Western Electric; E. F. Carter, Vice President A. T. & T.; W. J. O'Connor, Assistant to President, A. T. & T.; H. L. Wlodeck, in assistant comptroller Behan's department; R. B. Shaver, Assistant Comptroller, A. T. & T.; G. B. Proud, Western Electric; R. E. Cowley, Western Electric; M. B. French, O. & E. of A. T. & T.; H. A. Trax, general auditor New Jersey Bell Telephone Company; H. C. Gretz, General Auditor Ches. & Pot. group of Telephone Companies; G. J. Brett, General Auditor, Michigan Bell Tel. Co.; R. P. Baird, General Auditor Northwestern Telephone Company; N. R. Powley, Vice President Pac. Tel & Tel. Co.; F. N. Rush, Vice President Pac. Tel. & [fol. 7789] Tel.; all presidents of the Associated Companies; W. J. Stout, Assistant Treasurer A. T. & T.; A. H. Richardson, in Chief Statistician's Division A. T. & T.; W. A. Mason, R. F. Wolff—I don't remember their titles; J. A. Griffin, in Assistant Comptroller Behan's division; Z. Z. Hughes, O. & E.; I don't know E. S. Wilson's department nor E. F. Carter's, but I will look that up and let you know.

The distribution chart I have been examining is the current chart and I think that running over the years there was a similar distribution chart.

G. B. Proud is assistant comptroller Western Electric; I don't know Mr. Cowley's position in the Western Electric.

With respect to CR-52, there is certain information under the titles "Net Telephone Earnings" and "This Month, Increased over last Month, Months this Year, Increase over same Period Last Year," given, which information is furnished by the various associated companies. The same source exists as to "Total Net Earnings," in that all the data contained in CR-52 is obtained from Associated Companies Reports. Net telephone earnings to average plant in service during 1931 and same period last year comes from the same source.

In compiling the figures under the title "Average Plant in Service during 1931" and the same period previous years, there is not included construction work in progress. The purpose of the report is to show a comparative state-

ment by companies of the various items and they are all on a comparable basis.

Respecting report CR-53 the source of the information given under the head "Dividends from Associated Operating Companies" are reports of the general department as to earnings, Mr. Uhrig's division. The source of the information on the undivided profits is the report of the operating companies. "Interest from Associated Operating Companies" is obtained from our own report; "Licensee Revenue" is obtained from Mr. Uhrig's report; "Long Lines Net" from reports of Long Lines; "Dividends of the Bell Telephone Company of Canada and Western Electric Company, Inc."—reports made up by Mr. Uhrig. "Other Revenue"—Mr. Uhrig's report. "Other Revenue" means mis- [fol. 7790] cellaneous items other than those mentioned.

There is another statement "Assuming that the expenses of the American Company, General Department, are paid from licensee revenue, the 9% dividend is derived from the following source," which latter statement refers to the 9% dividend of the A. T. & T. upon its stock.

The item "From Other Revenue" is a small item and is the same sort that appears above.

At the bottom there is another legend "Associated Operating Companies (excludes A. T. & T. Co. Long Lines Department)" and under that there is a further legend "Comparison Net Telephone Earnings to Average Plant in Service" and underneath that there is another legend "Balance, Net Profits after Preferred Dividends to Average Common Stock." I cannot say whether those items have been kept during the full time I have been in my division. I don't know how far back they go.

BANCROFT GHERARDI, for defendants.

Direct examination.

By Mr. Haight:

I reside at Short Hills, New Jersey; I am Vice President and Chief Engineer of the A. T. & T. and have been connected with A. T. & T. since 1907; prior to that I went to the Polytechnic Institute at Brooklyn and graduated scientific course 1891, degree of B. S.; I then went to Cornell and took an electrical engineering course, graduating in 1893. I went back there for postgraduate work and received Master's degree in 1894; I then went to work with the New York

Telephone Company, then Metropolitan T. & T. Co. in February 1895 and continued with that company until 1900 or 1901, when I went to Brooklyn as chief engineer of the New York & New Jersey Tel. Co., now part of the N. Y. Tel. Co.; it operated all of Long Island and all of New Jersey; I was there until March 1906; at that time the operating organization of the New York Tel. Co. and of the New York and New Jersey Tel. Co. were consolidated, and I became chief engineer of both companies, which position I held until 1907, when I went with the A. T. & T.

[fol. 7791] I have been Chief Engineer, my present position, from 1919 and became Vice President in 1920 or first part of 1921; from 1907 until 1919 I had no definite title until April 1909, after which time my title became Engineer of Plant.

Defendants' Deposition Exhibit 53 for identification, consisting of 7 sheets, is the organization diagram chart, Engineering Department of Department of Operation and Engineering of the A. T. & T. The Engineering Department of the A. T. & T. does not itself operate anything. It advises and suggests to the Associated Companies and the Long Lines in the operation and engineering work which they do. The department has nothing to do with the purchase of operating properties. It advises as to the types of equipment, of apparatus and arrangements which can be most effectively used to meet various conditions in connection with operation.

There is uniformity in telephone equipment maintained throughout the Bell System. That is brought about through the fact that there is a common agency through which such equipment is designed and developed and through the fact that there are recommendations made as to the methods in which the equipment shall be used. The agencies concerned are the O. & E. Department, Dev. and Research Bell Tel. Lab. and the Western Electric. The O. & E. Department through its constant touch and advice which it gives to the Associated Companies, obtains familiarity with conditions existing in the Associated Companies and the Long Lines, and is in a position to and does advise the Department of Dev. & Research as to the needs of the operating system or as to the troubles which may exist with regard to the existing methods and devices.

The O. & E. Department does practically no invention work. Occasionally, but very rarely, in its efforts to im-

prove or to standardize or to solve problems or meet new conditions, it evolves inventions. The O. & E. Department generally works out what might be called the operating methods. It is then the duty of Dev. & Research or Bell Lab., or the two working together, to develop the necessary instrumentalities. If the methods need new instrumentalities, then it is their object to develop those. The Western Electric of course manufactures the equipment and has a part in dealing with the laboratory to discuss with the lab- [fol. 7792] oratory the practicability of anything which the laboratory may propose for use. Very seldom, however, does the O. & E. Department in connection with its general work in the system, advice Western Electric. The O. & E. Department's principal direct connection with Western Electric is when the Associated Companies need anything which, for any reason, may be difficult to get at the time the Associated Companies want it, or the Long Lines want it, to help the Associated Companies get it.

There is no place where the final authority on questions of standardizations reside. There are places where the responsibility for recommending standards arises, but that authority does not carry with it the power to enforce the use of those standards. The O. & E. Department determines standardization for the apparatus, circuits and systems and also operating methods which applies to both the Long Lines and Associated Companies. The O. & E. Department advises the Associated Companies as to the best and most effective methods of making fundamental plans. It discusses with them the matter of difficult questions that come up in the making of those plans and consults with them as to the results of the plans if the Associated Companies desire such consultation.

Naturally all fundamental plans must assume some switching methods, some types of equipment to be used, because all a fundamental plan is, is a method to estimate from 15 to 20 years ahead what your arrangements will be to take care of the business. Some basis of taking care of the business as to operating methods and as to type of equipment must underlie a fundamental plan. And naturally the only practical basis upon which a fundamental plan can be made is to use the then best known methods and equipments as the basis of the plan.

The needs of long distance service of immediate character and future needs practically have no effect in the de-

velopment of a local fundamental plan. There is no especial necessity for conforming the equipment in a local fundamental plan to serve in long distance service. A local plan as such can be developed in utter disregard of any long distance service requirements. However, the long distance service requirements are necessarily considered in what is [fol. 7793] known as the toll fundamental plan. The toll fundamental plan does not concern itself with local equipment.

There is no definite relationship or necessity for relating toll fundamental plans with local fundamental plans, except for one thing,—they naturally ought to be consistent as to magnitudes; and at the moment I do not think of any necessity for any relationship between local fundamental plan and the toll fundamental plan in respect to equipment. The relationship on account of magnitude comes about in this way. If you are making a plan for any given place for 20 years from now, you have to allow for the estimated growth in that place in that period. While they are not the same there is some relationship between the growth of the local business and the growth of the toll business to be expected in 20 years. If the plans are made for the same period there should be that general consistency in their magnitude.

When I speak of toll business, I am referring to both that of the Long Lines and that of the local company. The O. & E. Department has assisted and cooperated with Illinois Bell, in the making of fundamental plans. That assistance and cooperation has been, of course, of the same general character as assistance and cooperation with reference to fundamental plans of other companies, but every fundamental plan differs as to local conditions. In many cases the O. & E. Department reviews the fundamental plan after it is completed by the Associated Company and makes suggestions, recommendations or criticisms that might occur, if it is thought that the plan is not the most effective one that could be devised.

Of course, the benefit of our experience on all preceding fundamental plans is brought to bear on the Illinois Bell plans if we assist on them and others and that experience which we got there is added to our previous experience in regard to all subsequent plans.

There is a relationship between the fundamental plans of the different companies one with the other, in that they

are all handling telephone business. Telephone business has certain similarities even in different places. There are different conditions in every place. There are some general conditions of similarity so there is that relationship to be found between the plans. These plans are dealing with, [fol. 7794] generally speaking, similar problems in different places and where conditions vary. On the other hand, the result of a fundamental plan in one place does not affect the fundamental plans in another place unless the places are adjacent to each other, so that they are in effect parts of the same local community.

I don't know of anything that can be characterized as a program or fundamental plan in existence that relates to the entire country, as far as the Bell System is concerned. Perhaps a very large number of plans taken together might be so considered. The objective of the number of plans taken together would be to take care of the telephone business of the country today and tomorrow.

As to whether as an engineering proposition there is any necessity for coordinating these associated companies or the fundamental plans, I would say that if engineering is to be considered as doing things in the best way from the physical standpoint, I would say there was, the general reason being that engineering wants to do things in the best way and to the extent that the conditions and the general problems that they are dealing with is the same. There is a general similarity between what constitutes the best and that constitutes a tie between them.

In the event that a Chicago fundamental plan called for a grounded circuit with iron wires, I would say that if such a thing were called for by the dictates of good engineering, the thing to do would be to provide the necessary arrangements in order that they could be used. I could not, however, conceive of conditions under which I would approve of such a plan in the City of Chicago under the present state of the art, the reason being that there are very serious objections to grounded circuits, particularly where they have to be operated in cables, and pretty nearly all the Chicago telephone plant is in cables. Condensed, the reason is that one could not give good telephone service over grounded circuit in Chicago. I would not, however, take into consideration any requirements of long distance service in that connection. I would say, broadly speaking, that if the local plant is built so that it will take care of the local

conditions, the requirements of the local plant have been satisfied, from an engineering standpoint.

[fol. 7795] The assumption that "if the local plant is developed to any extent to care for long distance connections from the standpoint of local service, that would be an unnecessary development" is contrary to the fact. I think it is a correct assumption that there is no relation to the development of local plants and long distance plants, except as it relates to magnitude, although of course there is a relationship arising from this fact that it is an advantage to the local plant in its own development that it shall be able to give the most extensive service possible.

If at each local plant you succeed in giving satisfactory local service, then as far as the local plant is concerned the conditions are satisfied to enable a nation-wide service to be given so that a person in any part of the country can talk to any other person in the country without limitations of distance or property ownership. No coordination is necessary, except in the sense that coordination may mean having adequate standards of local service. In that latter sense coordination is necessary.

During the time that I have been doing telephone engineering there have been improvements in construction methods that have had an effect upon the construction of telephone plants in a city like Chicago. Such improvements are underground cables, switchboards, design and the arrangement of buildings, conduits, substation equipment. There have been improvements in tools and improvements in the methods of doing the work and improvements in the organization by which the work is directed, which relate to actual construction work. Improvement in tools are tools used for adjusting the various types of apparatus; tools which installation and construction people use in the doing of the work. There have been improvements in the instrumentalities such as motor vehicles and things like that, used in transporting people and materials to the job. Tools for adjustment are very numerous. I would have to refresh my recollection before answering that in detail. As an illustration, I will refer to the tools which we use for properly adjusting the subscriber's bell at subscriber's station in order that the instrument may always be in the very best condition for use.

Another outstanding one is the tools for the adjustment of [fol. 7796] spring jacks in switchboards. In the constru-

tion of pole lines there have been improvements in motor vehicle equipment, including the providing of trench digging machinery and pole-placing machinery which is used in the construction work under telephonic conditions. This has resulted in making the construction of pole lines more economical. These economies are substantial. I would have to refresh my recollection, however, as to figures. The amount of the decrease in cost would vary to some extent in different parts of the country.

The method of construction of manholes, the arrangement devised for the construction of manholes, have diminished the cost of manhole construction. We do not develop switchboard installing methods, but I do know that improvements have been made, but I could not state just when.

About 1920, but I could not place the exact date, I think there were improvements in regard to avoiding the assembling of all the parts of the switchboard in the place where it was to be erected, saving cost of installation. The older method of assembling switchboards used to be to ship switchboards in the various parts and to do a very large amount of the assembling on the job. About 1920 I think it was, plans were modified so that a great deal could be done in the way of assembly work and adjusting work in the factory and parts were shipped in larger units, thus requiring less work in putting them together at the local exchange where they were being installed. I don't know how that has affected savings, but I could refresh my recollection on that.

When I speak of automobiles in connection with the installation of pole lines, I referred to that as well as other construction. I had in mind, for one thing, that automobiles in the local exchanges, equipped with all the necessary materials that are needed for the installation of stations and the installation of Private Branch Exchanges, require special designs of one kind or another and so material can be stored away in such ways that it can be immediately accessible and those designs have been prepared and arrangements like that have been made available to the associated companies. For the pole line construction there is, of course, the problem of transporting the pole, transporting [7797] the cable and digging the hole for the pole. For placing a cable especial automotive machinery has been

designed for that kind of work and is used by both the associated companies and the Long Lines.

Sometimes these improvements in tools for construction have cheapened construction costs and sometimes they have resulted in better construction and sometimes both. These improvements in construction would affect a good many of the different constituencies of telephone plant. Generally speaking, improvements in methods of work extend throughout the entire plant.

Taking the improvement movement in construction as a whole, that has been going on right along. It has been a continuous evolution for a good many years. At one time a particular thing may come to fruition, at another time another thing. Generally speaking, it has been a concerted movement and resulted in the development of better and cheaper tools with which to apply those methods. I should say since the war there has been relatively more accomplished.

With reference to organization, I perhaps can give you an illustration. There used to be a time when stations would be installed by having a couple of men go around there with the station equipment, the bell box and everything else that was necessary and put it in then and there. Methods have been developed and this is primarily an organization matter by which all of the various tools and equipment have been brought to the station and one man goes around there and installs it. Generally speaking, if you can do a lot of construction work in one operation, it is cheaper than if a little piece is done here and then another little piece and then another little piece, done at different times, assembling the material, arranging the organization and making the plans each in little bits.

Generally speaking, I am familiar with work done under the terms "specific estimates" and under "routine estimates." When a large job is done, it is done under a specific estimate. For example, if a new building is to be built, a new conduit is to be built, a new cable is to be laid, of reasonable magnitude, a specific estimate is prepared for that work. There are considerable quantities of such work [fol. 7798] such as the small work of installing and moving stations and installing and moving private branch exchanges and bits of other things which are going on all the time and where the individual jobs really have no special,—where no specific estimates can be prepared. It would cost more

prepare the specific estimate for installing a single station an it would to build the station, so a routine estimate is estimate prepared to cover a lot of small items of the me general character. You might prepare a routine estite to install 10,000 new stations or you might prepare routine estimate covering all the new stations to be inlled during the next three months. The usual practice is prepare routine estimates covering the estimated reirements for a given period of time rather than to cover a ven amount of work.

There have been improvements made with reference to e construction of conduits since 1914, such as trench digng machinery, machinery for breaking up pavements, for mping back over the trench after it is filled, things of that pe. There has been a good deal done along that line since e war. So far as that single factor is concerned, it has duced the cost of construction. Yet the trend of the other ings that go into those costs may be such that the final sts are larger than they were before. But so far as imovements in methods of installation and improved equipnt employed to install are concerned, they have cheaped the costs of construction or have done a better job. y department makes studies of provisional estimates of sociated Companies.

The provisional estimates reflect the expected operating sults of the companies during the succeeding year in conderable detail and then for a year or two after that in mewhat more bulk. We review the provisional estimates order to advise the operating companies and the Long nes and to comment to them on the basis of the operations ich they are proposing.

The Illinois Bell prepares the provisional estimates for icago. It is an organization work. The organization as whole of the Illinois Bell is pretty much involved in the eparation of provisional estimates. There is no one in r organization that has particular charge of Chicago.

d. 7799] There is a little work in our organization done connection with the expected plant operating results ich will come in the Plant Department from the proional estimate as submitted. We make use of the proional estimates sent to the A. T. & T. in that we study and advise the Associated Companies with respect to basis upon which they are planning their operations for ceeding year. The advice is for the purpose of arriv-

ing at the best and most economical basis to operate the companies and to give good service. There are variations in gang efficiencies. Where gangs use the same methods, sometimes the variations are due to extraordinary conditions. Some gangs may be working under more difficult conditions than other gangs and they may be working under worse weather conditions and there may be other conditions which are different. As gangs are made up of human beings, there are necessarily variations in the gangs themselves. Since the war, generally speaking, there has been improvement in gang efficiency. A number of things have brought that about, such as better organization for carrying on the work, more effective planning in the ordering of the work so that the gangs have less lost time, better methods and better tools; sometimes better apparatus and equipment that require less work.

In a general way it has been often possible to change the number of gangs to get more effective results when gangs are provided with new and different types of machinery. The general effect of that is to change the size of the gang. For instance, it takes a large gang to build a conduit if the trench is to be dug by hand. A smaller gang will suffice to build that same conduit if the trench is dug my machinery. The methods and sizes of gangs are often quite closely related. By improving gang efficiency, we have been able not only to do better work but we have been able to reduce construction costs, considering that factor isolated. Of course, many other factors go into construction costs but as far as that single factor is concerned, it is so.

(Right to cross-examine reserved until later.)

[fol. 7800] Pierre W. Saxton, recalled.

Further direct examination.

By Mr. Haight:

The official files referred to in the distribution chart are kept in my division, Room 2409 of this building.

Mr. Haight: I would like to have produced by the witness for each of the years 1919 to 1930, both inclusive, C. R. Reports 51, 51a, 51b, 52, 53, 53a, 54, 54a, 55, 55a, 65, 65a, 65b, 66, 67, 67a, 67b, 76, 86, 91, 92, 94, 97.

Mr. Blackman: Some of those reports mentioned the cour

sustained objections to recently. I can state definitely now that as to anything the Illinois Court ruled upon in accordance with our contention that you did not have the right to examine that, we will not have the witness produce now.

After 15 minutes' recess Mr. Blackman further stated:

I have examined our records and find that as to C. R. 51 and 51a, we have agreed to let you have them and we have sent for them and they will be here in a moment. As to the others I can find no record of any request for the other reports. Mr. Bracelen is ill today, and he may have a record of those requests.

Mr. Haight: Mr. Blackman has now produced what I understand to be the condensed summary reports C. R. 51 and 51a for the years 1919 to 1930, both inclusive.

Defendants offered C. R. Reports 51 and 51a in evidence, to which plaintiff objected on the ground that they were irrelevant, the exhibit number and the C. R. Report for the year corresponding, being indicated as follows:

C. R. Report 51—1919—Defendants' Deposition Exhibit 54.

C. R. Report 51—1920—Defendants' Deposition Exhibit 55.

C. R. Report 51—1921—Defendants' Deposition Exhibit 56.

C. R. Report 51—1922—Defendants' Deposition Exhibit 57.

C. R. Report 51—1923—Defendants' Deposition Exhibit 58.

C. R. Report 51—1924—Defendants' Deposition Exhibit 59.

C. R. Report 51—1925—Defendants' Deposition Exhibit 60.

C. R. Report 51—1926—Defendants' Deposition Exhibit 61.

C. R. Report 51—1927—Defendants' Deposition Exhibit 62.

C. R. Report 51—1928—Defendants' Deposition Exhibit 63.

C. R. Report 51—1929—Defendants' Deposition Exhibit 64.

C. R. Report 51—1930—Defendants' Deposition Exhibit 65.

[fol. 7801] C. R. Report 51A—1919—Defendants' Deposition Exhibit 66.

C. R. Report 51A—1920—Defendants' Deposition Exhibit 67.

C. R. Report 51A—1921—Defendants' Deposition Exhibit 68.

C. R. Report 51A—1922—Defendants' Deposition Exhibit 69.

C. R. Report 51A—1923—Defendants' Deposition Exhibit 70.

C. R. Report 51A—1924—Defendants' Deposition Exhibit 71.

C. R. Report 51A—1925—Defendants' Deposition Exhibit 72.

C. R. Report 51A—1926—Defendants' Deposition Exhibit 73.

C. R. Report 51A—1927—Defendants' Deposition Exhibit 74.

C. R. Report 51A—1928—Defendants' Deposition Exhibit 75.

C. R. Report 51A—1929—Defendants' Deposition Exhibit 76.

C. R. Report 51A—1930—Defendants' Deposition Exhibit 77.

On the back of C. R. 51 for the year 1922, there is a note to the item of undivided profits for the year shown on line 29 on the face of the report which states that the item "includes revenues held in reserve pending rate decision as follows":

Then is given the names of certain companies and the amounts opposite each. That information came from the report of the various companies. Below that there are two notes, the first one indicating that the figure of average capital obligations shown on line 33 on the face of the report includes the capital stock installments; the second note indicating that the item of average capital stock shown on line 34 on the face of the report excludes capital stock installments.

C. R.-52, C. R.-51 and C.R.-51A are made up from the same sources. Information contained on C. R.-52 is not used in making up reports C. R.-51 and C.R.-51A.

Referring to C. R.-52 there is the title "Distribution of Total Net Earnings for Month of —." I cannot say as to whether we have for the entire period that I have been in charge of my division, C. R.-52 Reports. How long I ha

been regularly engaged in making up this report,—I would have to refresh my recollection. Those reports are regularly distributed as indicated in Distribution Chart Defendants' Exhibit 52 for identification. The list of companies whose names appear in the left-hand column of C. R.-52 are the associated companies of the Bell System. These reports show the net telephone earnings for each of those companies and also the total net earnings with the exclusion of duplications. With the same qualification that duplications are [fol. 7802] excluded, the reports show the average plant in service during the time indicated upon each of the reports.

The information contained in C. R.-53 Reports is not used in making the C. R.-51 or C. R.-51A Reports. I think these reports C. R.-53 were used when I first took up my present position. The reports made up in my division are placed in an official file and are preserved. I will find out how long C. R.-52 and C. A.-53 have been used. C. R.-53 is not used in making up the other C. R. Reports. C. R.-53A has information called for by the form and for the various years indicated. I don't remember when we commenced using 53A but I will refresh my recollection.

C. R.-54 is not used in the compiling of Reports 51 or 51A. I will refresh my recollection as to how long C. R.-54 has been used. The same answer as to C. R.-54A as for C. R.-54. The same answer as to C. R.-67. The same as to 67A; 67B; C. R.-76; C. R.-86; C. R.-91; C. R.-97. The information in those reports is not used in company reports C. R.-51 and 51A.

I will check up and ascertain as to how the different reports have been changed, if any.

The same answer as to C. R.-94 and C. R.-97.

The general subject matter of the different reports has remained the same. I will check up on all that.

C. R.-52, C. R.-53 and C. R.-53A were first prepared in 1920; C. R.-54 was prepared since a date prior to 1919. Prior to 1931 the title to this report was "Comparison of Provisional Estimate and Actual Results (Excluding Purchases, Sales and Transfers) for — Months Ending —."

C. R.-54A first prepared in 1925; prior to 1931 the title to this report was "Comparison of Provisional Estimate and Actual Results (Excluding Purchases, Sales and Transfers) for — Months Ending —."

C. R.-67 was first prepared in 1927 in its present form. Prior to 1927 the report known as C. R.-67 was a consolidated Bell System payables report. Such a report is no longer in existence.

C. R.-67A was first prepared in 1928; C. R.-67B in 1931; C. R.-76 and C. R.-86 were prepared since dates prior to 1919. C. R.-91 was first prepared in 1920. C. R.-97 was first prepared in 1931.

[fol. 7803] The difference between C. R.-51 and C.R.-51A is that 51 is a consolidated report for the Bell Telephone System in the United States, including Associated Companies, Long Lines and A. T. & T. General Department. C. R.-51A is a report for the Associated Operating Companies excluding Long Lines and General Department. Only the United States is covered in those two reports, except that as to C. R.-51 it includes revenues in the form of dividends received from the Bell Telephone Company of Canada.

The source of the information contained in C. R.-51A are the reports received from Associated Companies, which reports come on standard forms. I believe that the information appearing upon 51A comes from the same form from each of the Associated Operating Companies and the information appears on a monthly report form. The report is prepared from more than one of the reports of the Associated Company. It is a summary of the reports from all the companies as indicated. Reports of the different companies are of the same character upon these forms.

Speaking for the moment of one of those companies, the information on C. R.-51A comes from a plurality of reports on forms.

C. R.-51A is the same as monthly report No. 1 for the individual company.

It is fair to say that C. R.-51A is a summary of monthly reports No. 1 from each of the several Associated Companies, with the qualification that duplications are excluded.

Referring to Blank Form C. R.-51A used in the year 1932, and line 42 thereof, there appears in parentheses the words "except Adv. and Dir.," which means "except Advertising and Directory."

Referring to line 37 of C. R.-51A for the year 1923 and the same line of C. R.-51 for the same year, it is my understanding that total telephone revenues to average plant in service there indicated, does not exclude the items in the parenthetical clause referred to in the form now in use.

The item on line 31 "Average Plant in Service" of C. R. Reports 51 and 51A for the year 1923, has had no deduction for depreciation reserve, but excludes construction work in progress.

The items in lines 1 to 5, inclusive, of C. R.-51 and 51A are [fol. 7804] taken from the books and are ledger values of the Associated Companies.

We do not use the monthly report No. 1 in summarization to get these figures appearing on C. R.-51 and C. R.-51A as these are condensed summaries. The various lines on this report consolidate several accounts in each case and in preparing our consolidated summary, we go back to what may be termed the original sources,—the other reports of the company, which reports are of revenue and of plant in general reports which give more detail than monthly report No. 1. The reports used in preparing C. R.-51 and C. R.-51A are monthly reports No. 2, balance sheet, monthly report No. 3, income statement for month of —; monthly report No. 4, telephone operating revenues report for month of —; monthly report No. 5, telephone operating expense for month of —; monthly report No. 7, on station circuits and central offices for month of —; monthly report No. 21, plant and general equipment added, removed or abandoned for — months in —; monthly report No. 23, report of operating changes for month.

In addition, certain items are obtained from monthly report No. 1, condensed summary of reports for — month. There are no additional reports used to compile C. R.-52.

As to C.R.-53, I am not quite sure whether additional reports are used.

As to C. R.-53A, I think we would need certain other information for that report which is obtained, I believe, from a report by Mr. Uhrig's division, and we would obtain from that report the per cent of interest of the American Company in the various Bell System Companies.

C. R.-54 and 54A can be compiled fom those reports I have mentioned. The information on C. R.-67 is obtained from monthly reports No. 22A of the Associated Companies, entitled "Comparison of Actual Results with — View for — Months of — to —," and that report is in the same form as C. R.-67.

The information contained on C. R.-67A is obtained from the monthly reports No. 22B of the Associated Companies,

entitled "Review of Provisional Estimates as of — date" and 22B is in the same form as 67A.

The data for C. R.-67B is obtained by summarizing Re- [fol. 7805] ports No. 22C of the Associated Companies, which is the same as 67B.

C. R.-76 and C. R.-86 are made up from the same monthly reports as used in the preparation of C. R.-51 and 51A. C. R.-91 deals with the results of operation by states. Therefore, for those companies operating only in one state, the information can be obtained from the same sources as are used in the preparation of C. R.-51 and 51A. When companies operate in more than one state the information is obtained from a report from the Associated Company, the number of which report I do not recall. C. R.-97 is a report for the Bell Telephone System in the United States and the figures are obtained from other C. R. Reports referred to.

The various reports identified as to sources have all been kept on file in the offices of A. T. & T.

Mr. Haight: I ask that the witness produce the various reports from the various Associated Companies for the years 1919-30, both inclusive, stated by the witness to have been used as the sources of information in preparing C. R.-51 and 51A for each of the years in question; also Reports 22A, 22B and 22C and special report for C. R.-91 covering the same period of years.

Mr. Blackman: I would like to consult Mr. Bracelen about that before answering. Of course it is the policy of this company as far as possible to furnish all necessary papers, but I might say here, if those documents are the ones from which you could get the information that we have already denied you, I would be disposed to deny them also, but we will advise you.

The Witness (continuing): Other divisions of the Comptroller's Department than my division, receive copies of some of the reports. Monthly Reports No. 1, 2, 3, 4, 5, 6, 7, 22a, 22b and 22c and special report for C. R.-91 are all received by my division, and in some cases more than one copy is received. I cannot say at the moment to whom the additional copies go. I think Mr. Morello in my division handles the distribution of them. I assume they come by mail, but I never checked that. It might be that the reports come to Mr. Heiss first, rather than to me. However, my division gets all the copies if there is a plurality of copies, and I think whatever distribution there is is made by my

division. I am quite sure there is a record kept of the distribution of these monthly reports of the Associated Com-
[fol. 7806] panies that come to my division. The record of that is kept in my department and under my direction.

Mr. Haight: I would like to know what that record shows and what the fact is. I am going to ask the witness either to do it or I am going to ask Mr. Blackman to let us call Mr. Morello. I just want to show the facts.

Mr. Blackman: Yes, well——

Mr. Haight: Either way is all right.

Mr. Blackman: So far as I am concerned, I will facilitate your raising the point——

Mr. Haight: Yes.

Mr. Blackman: In so far as that bears on those matters that we are not inclined to give you information about, why, I am inclined to stand on what I think are my rights.

Mr. Haight: All right, then I will ask——

Mr. Blackman: But in so far as raising the question is concerned I will assist you in any reasonable way and we will not——

Mr. Haight: Then I will ask Mr. Saxton to acquire the information as to the distribution of these reports coming from the associated companies to his division, not only their distribution within his department to other divisions, but distribution outside of that and then I will rest with Mr. Saxton.

My division does not keep any record of any securities sold to other than stockholders of A. T. & T. If there is anything of that sort, I should expect it to be in Mr. Uhrig's division.

I think we keep a file of the bond circulars but my division does not have anything to do with the keeping of records. Very unlikely there is a copy of the circular issued by J. P. Morgan & Co. concerning the bond issue of $100,000,000 20-year Sinking Fund 5½% Gold Bonds of November 1, 1923; the same answer as to 35-year Sinking Fund 5% Gold Debentures, $125,000,000 issue of January 1, 1925; and also as to $150,000,000 5% Gold Debentures of February 1, 1930.

My department does not keep any records of the development and research work classified according to kind of work and the cost thereof. I may receive personally a copy of the expense report of Development & Research as prepared by

Mr. Uhrig; nor does my division keep a record of the loans made to Western Electric by A. T. & T. That is kept by [fol. 7807] Mr. Uhrig; nor do I have anything to do with the income tax records. I cannot state what division handles that.

As to monthly report No. 2, we receive seven copies, with one additional for December. One goes to Mr. Heiss, one to Mr. Hamilton, Supervisor in my Division; one to Assistant Comptroller Behan; one to Chief Statistician Andrew; one to Vice-President Gherardi; one to Mr. Blair-Smith, Treasurer; one to the official file. The extra copy for December goes to Mr. Brown in the Treasurer's Office.

As to monthly report No. 3, the same number with an additional copy in December are received and the distribution list is the same.

As to monthly report No. 4, we receive eight copies with an additional for December. One to each of the following: Mr. Heiss, Hamilton, Behan, Andrew, Gherardi, McHugh in Mr. Gherardi's department; Mr. French of Mr. Gherardi's department and the additional copy for December to Mr. Brown.

I have a chart which I have prepared before me—Defendants' Exhibit 78, which is offered in evidence; shows the distribution of these various monthly reports coming to my division and is made by my division.

Mr. Cooper, whose name appears on the chart, is operating vice president; Mr. Wlodeck is in Mr. Behan's division; Mr. Uhrig, assistant comptroller; Messrs. Burcher and Harrison both of Mr. Gherardi's department; also the Benefit and Medical Department appears on the chart Vice-President E. F. Carter among other duties is in charge of personnel work. They are all connected with the A. T. & T. and its departments.

Forms of monthly reports were marked as exhibits as indicated below and offered in evidence, to which plaintiff objected on ground of relevancy, and as unduly encumbering the record:

Monthly Reports

1—Defendants' Deposition, Exhibit 79.

1A—Defendants' Deposition, Exhibit 80.

2—Balance sheet—Exhibit 81.

3—Income statement for month of ... —Exhibit 8

4—Telephone operating revenue report for month of . . . —Exhibit 83.

[fol. 7808] 5—Telephone operating expense report for month of . . . .—Exhibit 84.

7—Report of Stations, circuits and central offices for month of . . . .—Exhibit 85.

21—Plant and general equipment added, removed or abandoned for — months ending . . . .—Exhibit 86.

23—Sheets Nos. 1 and 2—Report of Payroll changes for month of . . . .—Exhibit 87.

22A—Comparison of actual results for . . . .—Exhibit 88.

22B—Sheet 1—Review of provisional estimate as of . . . .—Exhibit 89.

Sheet 2—Monthly distribution of present view for period . . . . to . . . .—Exhibit 89.

22C—Present view of next year—Exhibit 90.

Analysis No. 10, entitled "Statistics showing the Results of Operations of Telephone Property for . . . . ending . . . ." —Exhibit 91.

Mr. Blackman stated his objection heretofore made was intended to apply to each of the above exhibits separately and to all of them.

Mr. Haight: Yesterday on the record, we made request of Mr. Saxton that he produce the monthly reports of the various associated companies for each of the years 1919 to 1930, both inclusive. I repeat that request and make the request in addition that there be furnished us for the years 1919 to 1922, both inclusive, and from 1923 to 1930, both inclusive, and I also make the request specifically for each of the years 1919 to 1930, both inclusive, and yesterday Mr. Blackman was to say what instructions would be given to the witness in that regard and I would like to know the answer now.

Mr. Blackman: The answer is that we will not furnish those reports of the companies other than the Illinois Bell.

Mr. Haight: Then may we have those for the Illinois Bell?

Mr. Blackman: Oh, I do not know; I suppose we could get those in a few minutes but you have had those already, I think.

Mr. Goldstein: What they did was, they said we could find all the Illinois Bell's in the offices of the Illinois Bell but they have not been identified so that we could look specifically over them.

[fol. 7809] Mr. Blackman: Well, if you want the Illinois Bell reports here for the purpose of convenience, why, we will get them. Do you want the witness to get them right now?

Mr. Haight: No. Then it may be understood that at some convenient time today, or if we are here tomorrow, those will be produced and we will identify them then.

Mr. Blackman: Surely.

Mr. Haight: As to the rest of the request that we have put in three different forms so as to cover the periods, as you have observed, with respect to those, as I understand it, the witness is instructed not to produce them.

Mr. Blackman: Yes, the witness will produce those under proper subpoena issued by the court and we will, of course, do all we can to attack and vacate the subpoena because we feel you have no right to those documents.

Mr. Haight: Now, off the record.

(Discussion.)

Mr. Haight: Now, Mr. Saxton, I wish you would tell me, and I have before me to refresh my recollection the form of CR-52. I would like to know, if you can tell me, the net earnings to average plant in service during the year 1923 of the New England Telephone & Telegraph Company as called for in the form first in this question identified.

Mr. Blackman: I object to that as irrelevant and immaterial as the New England Company not being in issue in this case and not bearing on any issue in this case.

Q. 307. Are you able to answer that question, Mr. Saxton? In order to proceed properly, I am first asking you, are you able to answer that question?

A. Not at the moment.

Q. 308. Would you be able, by refreshing your recollection by any documents or paper in your possession or under your control?

A. Yes.

Q. 309. And what would such documents or papers be that would so enable you to answer that question?

A. The monthly reports of the New England Company.

Q. 310. Now, I ask for an answer to that question; you may use those documents to refresh your recollection.

Mr. Blackman: The documents are not here and counsel instructs the witness not to refresh his recollection as to them.

Mr. Haight: Do I understand that, as counsel represent-
[fol. 7810] ing the A. T. & T. Company in this instance and the Illinois Bell Telephone Company, that the witness is instructed not to refresh his recollection to enable him to answer that question?

Mr. Blackman: You understand correctly.

Mr. Haight: Now, may it be understood, Mr. Blackman, that if I repeated the same question and went through the same procedure in regard to all the other information which would appear upon a report for the year 1923, CR-52, in respect to the New England Telephone & Telegraph Company called for in these various columns and if I should follow the same line of questioning in regard to each of the other companies here listed and if we questioned in a similar way in regard to each of the facts set forth on the filled out forms CR-52, CR-53, CR-54, 54A, 67, 67A, 67B, 76, 86, 91, 97 and 53A for each of the years 1919 to 1930, inclusive, that you would in each of those very many, several instances, give the same instructions and produce the same result, that is, that the witness would not be permitted to answer it or use that material?

Mr. Blackman: That is correct, with the single exception of the Illinois Bell. Any information concerning the Illinois Bell is at your disposal, and I might say that in instructing the witness to that effect, I am proceeding on the theory that your question is merely an indirect effort to get the facts in evidence that appear on a written document, the proper procedure being subpœna and the fact that the witness has stated that they would refresh his recollection or knowledge, I think it is obvious is not quite correct. The witness has no information or knowledge of the facts; all he has are the documents; he never knew the facts except as shown by those documents.

I want to make this plain, also, that we are not declining any information concerning the operations of the Long Lines Division, A. T. & T.; so far as that is concerned, if your question was broad enough to cover that, why, we are willing to disclose that.

Mr. Haight: I have put those questions in that way in order to save what obviously would be several days' time and it is in order that we may get the co-operation to save time that we have taken this wholesale method instead of repeating the specific question in each instance and as to each year and as to each——

[fol. 7811] Mr. Blackman: Yes.

Mr. Haight: And as to each fact?

Mr. Blackman: Yes.

The Witness (continuing): The data appearing in CR-52 line entitled "Total Associated Operating Companies" is prepared in our office. As to CR-53, some of the data doubtless appears on Associated Companies reports, some of it on the reports of Mr. Uhrig's division and how that is brought together, I cannot say. As to CR-53A, I cannot say.

As to CR-54, I believe that is all transcribed from the reports of the Associated Operating Companies and the Long Lines; the same answer as to CR-54A.

CR-67 is a summary of the reports of the Associated Companies and is prepared in my division. The same answer as to CR-67A and 67B. As to CR-76, a great deal of the data appearing is transcribed from the reports of the Associated Companies. I am not sure that it is all. The data appearing on CR-86 I think is substantially all prescribed from the Associated Company Reports except for the column headed "Total Associated Companies." CR-91 is all transcribed from the reports of the Associated Companies. CR-97 is data transcribed from other CR Reports.

Mr. Haight: Now, Mr. Saxton, I will ask you to produce in respect to each of these exhibits just identified again, all of the information that was computed in your division of the department.

Mr. Blackman: The same portion.

The Witness: Referring to Defendants' Exhibit 52, which was distribution chart for certain CR reports prepared in my division, there are certain persons named as distributees of certain reports who were not identified by departments —C. P. Cooper, Vice President, A. T. & T., is in the Operating Department, Operation C. Mr. E. V. Cox is under Mr. Cooper as Assistant Vice President. Mr. Gherardi is in the O. & E. Department. E. F. Carter is in the Operation Department, Operation H. G. B. Proud is Assistant Comptroller of Western Electric. W. A. Mason, O. & E., A. T. & T.; Mr. R. F. Wolff is of the same department as Mr. E. S. Wilson, who is Vice President, A. T. & T.

The following CR Report Forms were offered in evidence by defendants and objected to by plaintiff on the ground of

irrelevancy, immateriality and incompetency, the exhibit [fol. 7812] number corresponding being indicated:

CR-52—"Associated Operating Companies Excluding A. T. & T. Long Lines. Distribution of Total Net Earnings for the Month of ....."—Defendants' Deposition, Exhibit 92.

CR-53—American Telephone & Telegraph Company Earnings on Capital Stock—Defendants' Deposition, Exhibit 93.

CR-53A—Bell Telephone System United States—Defendants' Deposition Exhibit 94.

CR-54—Bell Operating Companies—Comparison of Results for .... months this year with same period last year—Defendants' Deposition, Exhibit 95.

CR-54A—Bell Operating Companies—Comparison of Results for .... Months this Year with Same Period Last Year—Defendants' Deposition, Exhibit 96.

CR-67—Associated Operating Companies Comparison of Actual Results with .... View—Defendants' Deposition, Exhibit 97.

CR-67B—Associated Operating Companies (excludes A. T. & T. Co. Long Lines Department) Present View of Next Year (in this instance 1932)—Defendants' Deposition, Exhibit 98.

CR-67A—Associated Operating Companies (excludes A. T. & T. Co. Long Lines Department)—Defendants' Deposition, Exhibit 99.

CR-76—Associated Operating Companies Statistical Units for .... Months Ending .... —Defendants' Deposition, Exhibit 100.

CR-86—Associated Operating Companies (excluding A. T. & T. Company's Long Lines Department) Unit Expenses for .... Months ending .... —Defendants' Deposition, Exhibit 101.

CR-91—Results of Operations by States (Annual Basis) Revenues and Expenses per average company stations and percentages—2 sheets—Defendants' Deposition, Exhibit 102.

CR-97—Bell Telephone System in United States, Months Ended ....—Defendants' Deposition, Exhibit 103.

Mr. Blackman: I object to each of the foregoing offers on the ground that each of the papers is incompetent, irrelevant

and immaterial on any issue in this case and on the further ground that it is merely an effort to gain information and to obtain comparisons for the purpose of attempting to work up something.

[fol. 7813] Provisional Estimates from the various Associated Companies, which would include the Illinois Bell, come to my division, but I would have to check to find out to whom else they go in the Comptroller's Department. Outside of the Comptroller's Department, I believe copies go to the O. & E. Department. I am not sure of any further distribution. Data from provisional estimates are used in the preparation of several of the CR Reports. No reports can be said to be compiled from the provisional estimates.

CR-67A and 67B I believe are all the CR Reports employing data derived from provisional estimates. Provisional estimates are not used in the compiling of CR-51 and 51A. Provisional estimates are made on forms. My division prepares a consolidated Bell System estimate for the entire system from the provisional estimates and copies of the consolidated estimate are sent to the O. & E. Department and doubtless to other divisions of the Comptroller's organization. I will check up and ascertain to whom these provisional estimates go.

Defendants then requested that plaintiff produce a set of forms and instructions in connection with such forms, in use from 1919 to 1930, both inclusive, with respect to provisional estimates; also the provisional estimates relating to the Illinois Bell Telephone Company for each of those years.

The Witness (continuing): I don't think there are any special letters or instruction or memoranda that go to any of the departments or individuals with CR Reports as indicated on Defendants' Exhibit 52, being the distribution chart for CR Reports in my division.

Defendants request that plaintiff produce for each of the years 1919 to 1930, both inclusive, CR Reports 51B, 55, 55A, 65, 65A, 66, 92 and 94.

By the Witness: I don't know of any reports from Associated Companies showing estimated annual revenue effect of contemplated or pending rate changes, going to any one in the Comptroller's Department. The same answer as to estimated annual revenue value of rate changes.

I located the circulars covering the bond issues I testified about. The circular bearing at the top the legend "$125,000,000 Total Issue A. T. & T. Co. 25 Year Sinking Fund 5% Gold Debentures dated Jan. 1, 1925, due Jan. 1, 1960" marked for identification Defendants' Deposition, Ex-[fol. 7814] hibit 104.

The circular bearing the legend "$100,000,000 A. T. & T. Co. 25 Year Sinking Fund 5½% Gold Debenture Bonds, dated Nov. 1, 1923, and due Nov. 1, 1943"—marked for identification Defendants' Deposition, Exhibit 105.

The circular bearing legend at the top "$150,000,000 A. T. & T. Co. 35 Year 5% Gold Debentures dated Feb. 1, 1930, and due Feb. 1, 1965"—marked for identification Defendants' Deposition, Exhibit 106.

I think my division obtained them from J. P. Morgan & Company. I think such of the information as is contained in these documents relative to the Bell System was furnished by my division. Data as to the A. T. & T. Company was probably obtained from Mr. Uhrig's Division.

I know that there was distribution of the documents and that a large edition was prepared. The bond issues were to be sold and we were asked to prepare certain information, and I assume that J. P. Morgan & Company used them for that purpose.

Information necessary in the preparation of similar documents for Associated Companies would be obtained from the Associated Companies. We might assist, however, in that instance.

I will see if there is any similar information or documents in the files of my division with reference to the bond issue of the Illinois Bell of 1923—$50,000,000.

Defendants' Deposition, Exhibits 104, 105 and 106, offered and received in evidence.

I don't think the Comptroller's Department gets reports from the Associated Companies showing the discounts on bonds sold to bankers, and I don't know that any division receives such reports. The total amount of bond discount and expense is, of course, shown on the Company's regular report. That includes the total to date, not only discount on the issues but the expense in connection therewith. The amount of bond discount and expense appears on the regular reports of the company which are kept in my division.

I will check to ascertain whether there is in my division a record of the bond discounts of the various bond issues sold by the Associated Companies of the Bell System from 1919 to 1930, both inclusive. I think Mr. Uhrig's division would [fol. 7815] have the records as to discounts on these three bond issues mentioned in Exhibits 104, 105 and 106.

CLYDE UHRIG, recalled.

Further direct examination.

By Mr. Haight:

I have a distribution chart showing the CR Reports prepared in my division and to whom such reports are distributed, which distribution chart is marked Defendants' Deposition, Exhibit 107 for identification. The names appearing upon the chart to whom different reports are distributed are as follows:

Directors and Executive Committee, A. T. & T.—self explanatory.

E. F. Carter, Vice President in charge of Personnel Department.

C. P. Cooper, Vice President.

W. S. Gifford, President.

Official File—Self explanatory.

C. A. Heiss, Comptroller.

B. Hamilton in Mr. Saxton's division.

J. F. Behan, Assistant Comptroller.

H. Blair-Smith, Treasurer.

T. H. Brown, Jr., Treasurer's Office.

C. Uhrig, Assistant Comptroller.

J. W. Green, Auditor.

J. A. Nixon, Assistant Comptroller, Uhrig's Department.

E. V. Cox, Assistant Vice President.

S. L. Andrew, Chief Statistician.

P. W. Saxton, Assistant Comptroller.

H. J. Brandt, Benefit & Medical Department.

B. Gherardi, Vice President.

E. S. Wilson, Vice President.

A. A. Marrsters, Secretary.

A. H. Ware, Assistant Comptroller, Uhrig's division.

J. L. R. Van Meter, Assistant Vice President.

F. B. Jewett, Vice President.

A. G. Swede, in office of Vice President Gherardi.
J. W. Van Sant, in office of Assistant Comptroller Behan.
W. A. Beckert, same office.
[fol. 7816] E. J. Clarke, Assistant Treasurer.
C. S. Van Cise, Assistant Treasurer.
A. W. Page, Vice President.
H. J. Foster, in Vice President Cooper's offic
C. M. Bracelen, Vice President and General Counsel.
L. Moll, in office of Treasurer.
R. B. Shaver, Assistant Comptroller.
W. J. Stout, Assistant Treasurer.
C. O. Bickelhaupt, in office of Vice President Cooper.

The executive committee consists of James S. Alexander, George F. Baker, Walter S. Gifford, Philip Stockton, David F. Houston and Daniel Willard. There may be one more. Mr. Alexander was the former president of the National Bank of Commerce in New York. Mr. Baker is Chairman of the First National Bank of New York; Mr. Gifford is President of this company; Mr. Philip Stockton is President of the First National Old Colony Bank of Boston. Mr. Houston is President of Mutual Life Insurance Company of New York. Mr. Willard is President of the B. & O. Railroad.

None of the CR Reports prepared in my division are based upon the monthly reports from the Associated Companies identified as follows: MR 1, 2, 3, 4, 5, 6, 7, and CR 22a, 22b, 22c, 23 and the special report that is used for CR Report 91. None of the reports prepared in Mr. Saxton's division form the basis for reports prepared in my division. In my division there is a record kept of the discounts in respect to the different bond issues referred to by Defendants' Exhibits 104, 105 and 106.

I have here a tabulation which refers to the three bond issues, respectively, which shows total discounts and expenses. Practically 100 per cent are expenses of A. T. & T. The large factor there is the cost of engraving the bonds.

If I can segregate the expenses incurred by Morgan & Company and those incurred by the A. T. & T., I will do so.

The tabulation mentioned is marked Defendants' Deposition, Exhibit 108 for identification.

My division does not receive from Associated Companies a report of estimated annual revenue affected by contemplated or pending rate changes. I don't know whether any

such reports are received by my division in my department. My division does not receive anything having to do with [fol. 7817] estimated annual revenue values on rate changes from any of the Associated Companies, and I don't know that any other division in my department does receive such reports.

JAMES F. BEHAN, for defendants.

Direct examination.

By Mr. Haight:

I reside Montclair, New Jersey; I am Assistant Comptroller, A. T. & T., and have been connected with that company since 1912 in the Comptroller's Department. I occupied my present position since middle of 1920. Immediately prior to 1920 I was Chief Accountant; prior to that I was Assistant Chief Accountant; prior to that Senior Accountant; prior to that, Accountant.

I have before me Defendants' Deposition, Exhibit 51, which is an organization chart of the Comptroller's Department, and my division is indicated thereon.

The word "Revenue" in my division must be read in connection with the title above and refers to division of methods, revenue accounting methods, and should read "Revenue accounting methods and results." We develop the forms used and methods covering all phases of the revenue accounting work, developing forms, methods of compiling the various kinds of revenue services, such as exchange and toll; forms for controlling the billing against subscribers and for classifying revenues and for furnishing the information necessary for the journal entry to the final accounts on the general books.

The purpose of preparing the forms is to give advice and assistance to the Associated Companies. They are not used to report the results to the A. T. & T. Central Organization. They are used only in the Associated Companies and to some extent in the Long Lines Department. We do not have anything to do with the development of forms for reporting to the central organization.

In connection with our studies of accounting routines, we very often have to make cost studies of present practices in order to compare them with the costs of a new practice under

study. That part of the work is done from time to time. We have, of course, some detailed procedure under study all the [fol. 7818] time. In some of these studies it is necessary for us to consider the element of cost; in others it is not. We make a cost study on some phase of the accounting work at least once each year.

We do not allocate the expense of doing this work to particular Associated Companies in any way. I cannot from looking at our records tell how much the cost of the work done for the Illinois Bell Company was for any of those services. For the Associated Companies we actually make comprehensive audits of the accounts and records of each company and the Long Lines Department annually. The purpose is as a service to the Associated Companies in order to determine that their accounts are correctly kept and that their underlying records substantiate the entries on the general books, that financial position is that stated on their balance sheet and that their income for that year is that stated in their income accounts. That knowledge as to financial condition is not necessarily used by A. T. & T. Company because we receive their monthly reports directly from them and unless in the audit we find a situation different from that reported in the monthly reports, there would be no use for the information we bring in as the result of our audits.

Not to my knowledge are the audits used in determining what advances shall be made to the Associated Companies. They are not relied upon in connection with such dealings except to the extent that the officers are interested in knowing that the accounts of the Associated Companies are correct, as shown by their reports to us.

The item "Field Studies and Accounting Methods and Results," relates to studies we make in the offices of the Associated Companies with respect to the best means of accounting routines, and such studies are made to the end of developing the most efficient and economical way of performing the accounting work, there being a necessity for constantly doing that. The necessity arises through the rapid growth of the business and the great volume of detailed work underlying our accounts. Systems are devised and continuously studied and kept up to date, taking into account the growths to which I have referred.

Every increase of the business does not necessarily require some change in our system of accounting or audit. However, we advise as regards changing when conditions [fol. 7819] justify such advice. I cannot answer as to whether that advice is advice that one would expect the Accounting Department of any institution doing business to need from the outside, but that advice is necessary for accounting in the Bell System, either locally or through a central organization to constantly study the routines underlying the handling of the great volume of business which we have to handle. That would be necessary regardless of reports made to A. T. & T., and the fact that reports are made to the A. T. & T. does not directly have anything to do with it, that I can think of.

When new devices come on the market, we consider them, consider their application to accounting work and make studies to see whether it is advisable to install such mechanical devices. If we determine that it is advisable, we make recommendations to the Associated Companies, if our conclusions justify them. We make general recommendations to all. Such recommendations are not necessarily followed. They may or may not be. To a great extent they are. However, I know of no instance where all the Associated Companies have refused to follow recommendations as to the use of mechanical devices in accounting work. We develop the procedure and forms for the companies necessary to be included in the Federal income tax returns. We consolidate the data furnished by the companies to be included in the consolidated returns. All of the clerical processes involved in the preparation of the consolidated returns are done in my division.

We develop the underlying routines of all thrift plans, which includes the employees stock plan. The legend "Employees Stock" embraces employes of the Bell System, and the stock referred to is the stock of the A. T. & T. It includes employes of the Western Electric, E. R. P. I., all of the subsidiaries of the Western Electric, and the Long Lines Department, Fidelity Bonding & Apportionment Methods refers to the handling of all matters relating to a blanket fidelity bond covering all of the employes of the Bell System. We handle all the dealings with the bonding company other than the filing of the claim. There is one blanket fidelity bond to cover all the employes. Every

employe from office boy to president of every company in the Bell System is covered. The insured is the American Company and each of the Associated Companies and the Western Electric and certain of its subsidiaries. Each com- [fol. 7820] pany pays its pro rata of the premium. It is charged separately to the Associated Companies and the Western Electric and such other companies as may be included. The premium is apportioned on the basis of the number of employes in each company falling within the three classes of employes provided for in the bonding rates; the blanket bond specifies rates for Class A, B and C employes.

In 1918 we commenced preparing consolidated income tax returns for A. T. & T. and Associated Companies in the Bell System. Some of the licensees or Associated Companies during this period have shown a taxable loss. That shows in the returns themselves. The Associated Companies are billed for their share of the income tax payment on the basis as they would pay if they filed their returns individually, except that if any companies controlled by an associate company and included in the consolidated return had a deficit, this deficit would be deducted from the taxable income of the controlling company.

I have computed how much the saving was to A. T. & T. Company by paying on the basis of consolidated income tax and charging on the basis of a separate income tax return to each of the Associated Companies. I have not the computation right here but it can be made available. I have either a pen and ink copy or a typewritten statement in my office.

(Defendants' Deposition Exhibit 78, omitted at this point.)

EDGAR S. BLOOM, for defendants.

Direct examination.

By Mr. Haight:

I reside at New York City; I am president of Western Electric and have been since August 1, 1926; I am a director in practically all the Western Electric subsidiary companies and am President of the Weco Corporation; I am a director of E. R. P. I., Teletype Corporation, Manufacturers Junc-

tion Railway and eight or ten small foreign subsidiaries of Western Electric Company.

The Weco Corporation is engaged in holding securities that were formerly owned by Western Electric.

I am a graduate of Engineering Department, University [fol. 7821] of Pennsylvania, 1895, and had one year post graduate work. In July of 1896 after I completed my post graduate work, I became connected with Metropolitan T. & T. Co., which was the predecessor of the present New York Telephone Company; was then in the Traffic Engineering Department for about a year; then I was transferred to the Construction Department and became foreman of construction gangs; after about a year I became construction engineer of the company and remained in that position until 1906; then I became Superintendent of Plant of the New York & New Jersey Telephone Company in Brooklyn for about a year and then Superintendent of Plant of the New York & New Jersey Telephone Company in New Jersey. Thereafter, I was General Superintendent of Plant of Pacific T. & T. Co., operating throughout the Pacific Coast; in 1909 I came back east with the A. T. & T. in charge of general supervision of Plant Operation of the Bell System, from the standpoint that the American Company supervised plant operations. Then I was Superintendent of Plant of the New York Telephone Company for the upstate property that they acquired throughout New York State, except the old Metropolitan area here in New York.

I went then to St. Louis in the spring of 1912 as Vice President of the four companies operating throughout the Southwest, that were combined into the Southwestern Bell System, and was there two years; I went to Chicago as Receiver of the Central Union Telephone Company for four years; became President of the Ohio Bell and Indiana Bell; Vice President of Illinois Bell; then I came back to New York in 1922 as Vice President, A. T. & T., and on August 1, 1926, became President of Western Electric.

Also, I am a director of the Bell Laboratories.

The Western Electric owns the entire capital stock of the Teletype Company and acquired it I think about October 1, 1930. The Teletype Company manufactures teletypewriters for use in connection with signalling over wires. At the time the Teletypewriter Company was acquired by Western, it had a Development & Research Department of its own and

still has it. I don't personally recall how large it is, but it was an organization satisfactory to the size of that corporation and carries on all the development work of the Teletype Corporation.

I had to do with the organization of E. R. P. I., in that I [fol. 7822] organized it. At the time it was organized the talking movies were not what they are today but the corporation was organized primarily in the first instance to take out of the Western Electric functions that were not related directly to the Western Electric as a manufacturing company, so that we transferred to E. R. P. I. all outside securities and also transferred to E. R. P. I. the rights under the talking movie patents, but as that business developed and the talking picture business became a large business, we again took the securities out of E. R. P. I. and put them into the Weco Corporation, but at first it was merely for the securities and for the original development of the talking movies.

We had a department in Western Electric at that time and we transferred that organization right over to E. R. P. I.

I am referred to an article which appears in the March, 1930, issue of the Western Electric News entitled "Foresight and Farsight in Purchasing," which quoted words are preceded by the words "Here, Mr. Secretary of Commerce, is the answer of one industry," and immediately beneath are the words "No. 5 of a series inspired by the report of Secretary Hoover's committee on elimination of waste" and beneath that appears the following:

"Foresight and Farsight in Purchasing. At Western Electric a highly trained purchasing staff is the 'lookout' that guides the purchasing for practically the entire telephone industry.

"The basis for all this is the unique relationship between Western Electric—which purchases, manufactures and distributes,—and the Bell System, which utilizes the nation's telephone equipment. This great telephone system computes and transmits to Western Electric a general view of its requirements five years ahead, detailed schedules one year ahead.

"To meet such long time planning this company must make sure in advance of its source of supply. Before any source dries up it must seek another, perhaps at some remote corner of the earth. When a shortage of one material

threatens it must find another material every bit as reliable. It also must buy at prices which are fair to the seller, in order that he may remain a reliable source of supply.

"This purchasing control correlates material with machinery of production, it avoids excessive inventories, it [fol. 7823] is an important factor of economy."

Beneath the above, appear the words "Western Electric, purchasers, manufacturers, distributors, since 1882 for the Bell System," and beneath that the words "This Western Electric advertisement was included in 'The Advertising Parade' published to make a permanent exhibit of the exceptionally good work in the field of 1928."

I think that is a fair statement as of that time.

R. W. Burgess is the chief statistician of Western Electric. I am referred to an article by Mr. Burgess which appears in the May, 1930, issue of Western Electric News, beginning on page 3 and running to page 6 and continued to and concluding on page 56. I am referred to certain extracts from that article as follows:

"Many of the outstanding peculiarities of Western Electric methods of operation are natural consequences of its close affiliation with A. T. & T. Company and its associated operating telephone companies. Such affiliations between organizations engaged in different stages of the industrial process is what the economist calls vertical integration. Examples of vertical integration in others fields are:

"a. Steel companies which own coal mines, ore lands, boats to carry ore on the lakes, and coke ovens as well as steel mills of various types.

b. Oil producing, refining and marketing combinations.

c. Chain stores which purchase direct from factories or even themselves own factories, in the first case combining the functions of retailer and wholesaler and in the second case, the functions of retailer, wholesaler and manufacturer.

d. Copper mining and refining companies which also own wire drawing plants, brass works and other fabricating units.

"The question as to whether such integration is or is not desirable from the general economic standpoint is illuminated by the experience of the Western Electric Company. As we know from our daily contacts, the identity of the inter-

ests of the Western Electric Company with those of our chief customers makes unnecessary much risk-taking and much expenditure of money and energy that inevitably occur when each sucessive step from raw material to service rendered yields a profit for a different set of stockholders. As a natural result of these savings, Western Electric prices to Bell Telephone Companies are distinctly lower [fol. 7824] than the prices of other telephone manufacturers to non-Bell telephone companies. Or, putting it another way, the margin between cost of raw material and essential labor and the selling price of the product is relatively small.

"Specific ways in which integration results in real savings are as follows:

"1. Sales effort in the ordinary sense is dispensed with. In a sense, Western Electric products are sold before they are manufactured. Representatives of the telephone companies know that the designs have been worked out by the Bell Laboratories and approved by the general departments of the A. T. & T. Company as the best for the purpose. When material of several designs is produced, the Western Electric representative has no object in urging one over the other and is free to pool his technical knowledge with that of the telephone company's representative.

"2. Continuity in engineering and production schedules is secured by co-operation with the telephone companies. If the preliminary line-up calls for peaks and valleys during the next year or two, arrangements are made with the telephone companies to rearrange the dates of enough projects to smooth out the schedule. As a result, the plant investment required by the Western Electric Company is low in relation to sales volume.

"3. Profit above a fair rate of return on investment is eliminated.

"4. Losses due to production of items which later prove unacceptable to the ultimate consumer are minimized.

"5. Opportunities within the system are provided for all types of employes. A man who starts in one company may be transferred to another company or to another department which requires a distinctly different type of personal qualifications.

"In addition to integrating public utility operation and equipment manufacturing the Western Electric Company also exemplifies integration of manufacturing and acting as purchasing agent. An important advantage of this sort of integration as exemplified by the Western Electric Company is that, as purchasing agent, the company can obtain better prices and terms than if it were not known that we may, as an alternative, manufacture ourselves. Our own familiarity, [fol. 7825] moreover, with manufacturing processes enables us to discuss more effectively with outside producers what is really a fair price.

"Space does not permit full discussion of the third way in which the Western Electric Company can serve the economist as a specimen, namely, the advantages of research work.

"It is an accepted operating principle of the Bell System and other progressive organizations that every item of equipment and every method is subject to improvement. Research of the engineering type is fairly common in these days. In the Bell System and several other leading concerns, however, this work has been extended to underlying physical, chemical and mathematical problems with a definite realization that it is worth while to conquer the unknown in connection with the broad field in which particular investigations have been made, even though the particular study may not have an immediate dollars and cents value. In the Western Electric Company the spirit of research has also been carried into methods of manufacture, sources and proper prices of raw materials and supplies and all methods of operation."

As to whether I agree with the extracts from the article which I have read, I would not want to answer as to the first part yes or no, unless I first studied steel corporations. I have not studied chain stores nor copper mining companies. I don't know the detail of the integrations of those other companies.

Referring to the portion of the article which reads as follows: "As we know from our daily contacts, the identity of the interests of the Western Electric Company with those of our chief customers makes unnecessary much risk-taking and much expenditure of money and energy that inevitably occur when each successive step from raw material to service rendered yields a profit for a different set of stock-

holders. As a natural result of these savings, Western Electric prices to Bell Telephone Companies are distinctly lower than the prices of other telephone manufacturers to non-Bell telephone companies," I would answer yes, because that affects certain things that are useless where we have such a close connection and close coopération, but that doesn't mean, however, that we do not have other risks. We do.

The following statement is correct:

[fol. 7826] "As a natural result of these savings Western Electric prices to Bell Telephone Companies are distinctly lower than the prices of other telephone manufacturers to non-Bell telephone companies."

Specific ways are then mentioned in the article in which that occurs and with that statement I agree in the ordinary course, because those savings are passed on to the Bell Companies.

As to the portion of the article which reads as follows:

"Sales effort in the ordinary sense is dispensed with. In a sense, Western Electric products are sold before they are manufactured. Representatives of the telephone companies know that the designs have been worked out by the Bell Laboratories and approved by the general departments of the A. T. & T. Company as the best for the purpose. When material of several designs is produced, the Western Electric representative has no object in urging one over the other and is free to pool his technical knowledge with that of the telephone company's representative." I don't know what sense he is referring to, but because of our close relationship, we have a very good idea of what they probably will require, but it is not a firm order until we get their order. That is, we have provisional estimates, but they are not firm orders. We know fairly definitely as to what they estimate the requirements to be for a year ahead and in a very broad way for five years ahead, and then in addition to that, each month each of our distributing houses keeps in close touch with the local telephone company and reports to us any change in plans.

The Western Electric in its relation with the Bell System has no selfish interest in promoting the sale of any particular apparatus. We are entirely out of ordinary competition and we do not design something that may have a particular sales appeal. It is developed through the Bell

Laboratories and when it is approved and made standard, it is on such a basis that we manufacture it and we do not ever design anything to give it a sales appeal.

The following statement in that article is correct:

"Continuity in engineering and production schedules is secured by cooperation with the telephone companies. If the preliminary line-up calls for peaks and valleys during the next year or two, arrangements are made with the tele- [fol. 7827] phone companies to rearrange the dates of enough projects to smooth out the schedule. As a result, if the preliminary line-up calls for peaks and valleys during the next year or two arrangements are made with the telephone companies to rearrange the dates of enough projects to smooth out the schedule. As a result, the plant investment required by the Western Electric Company is low in relation to sales volume."

With reference to the last mentioned quotation, it is correct with this qualification, it might be that in Denver there are two central offices equipments ordered and they schedule them both at the same time. That would mean that we would be at a peak for those six or seven months and we would ask to put one back a little and one forward a little so that we could keep an average force going continuously for more than six months. That is the theory. If you cut out the peaks and valleys, you have a fair return of investment and a complete working schedule.

The statement is correct that "losses due to production of items which later prove unacceptable to the ultimate consumer are minimized," because everything is approved and standardized before it is put into production.

The following statement answers itself:

"Opportunities within the system are provided for all types of employes. A man who starts in one company may be transferred to another company or to another department which requires a distinctly different type of personal qualifications."

With reference to that, I would say that the broader the scope of the work, the more you can transfer people around.

Assuming that the Western Electric manufactures and acts as purchasing agent, the following statement is correct:

"In addition to integrating public utility operation and equipment manufacturing, the Western Electric Company

also exemplifies integration of manufacturing and acting as purchasing agent."

I do not agree exactly with the following statement in said article:

"An important advantage of this sort of integration as exemplified by the Western Electric Company is that, as purchasing agent, the company can obtain better prices and terms than if it were not known that we may, as an [fol. 7828] alternative, manufacture ourselves."

There are two features there, first and last; in this case, in order to get the lower prices, and second, failing to get those prices we can manufacture ourselves.

The statement is correct that:

"Our own familiarity, moreover, with manufacturing processes enables us to discuss more effectively with outside producers what is really a fair price."

I am referred to an article by me in the January, 1929, issue of the Western Electric News entitled "The Bell System and Ourselves." "Our president traces the development of the telephone art and indicates a growth for the future." I will read that article and let you know later whether I agree with it as of that date and whether it expresses my views as of the present time.

I am referred to an advertisement in the Western Electric News, September, 1928, as follows:

"Here, Gentlemen, of the Committee, is the Answer of One Industry. A One-Way Street Production Policy.

In telephone making, production schedules move in one direction—forward. The machinery seldom needs to be thrown into reverse.

"Cancellations in this industry are rare.

"There is consequently little lost effort involving men, material and machines.

"There is a minimum of waste in scrapping or storing partially fabricated parts.

"How is this possible?

"Because of the close relation between Western Electric as purchasers, manufacturers and distributors and the operating telephone companies of the Bell System served by it.

"Here is another striking economy which contributes to the low cost of your telephone service.

"Western Electric, Purchasers — Manufacturers — Distributors." And the letter "f" in the word manufacturers" has a line which includes this legend: "Since 1882 for the Bell System."

Allowing for the poetic license of the man that writes an advertisement, that is generally a correct statement.

I am referred to an advertisement in the Western Electric News, May, 1928, as follows:

"Here, Mr. Secretary, is the answer of one industry." [fol. 7829] And then the heading, "Planning moves five years ahead."

"Seasonal production with all its economic disturbance persists as an evil in many American industries. But in telephone making it has well-nigh disappeared.

"Western Electric knows substantially what it must produce five years hence because of its close relation to the Bell System. Telephone engineers, skilled in gauging population trends in the growth of telephone service establish the requirements to which Western Electric directs existing production facilities and provides for additional facilities when and where needed.

"What follows is a production curve relatively free of peaks and valleys. Inventories are kept at a minimum, machinery is busy, employment is stabilized, plant investment is accurately related to production needs, wages have progressively risen relative to the cost of living while prices have been substantially reduced.

"Thus does Western Electric by balancing production with demand, eliminate waste in the great industry of telephone making.

"Western Electric.

"Purchasers—Manufacturers—Distributors."

And relating to the "Manufacturers," the words "since 1882 for the Bell System."

The statement in the above was correct as of that time and it was based upon 30 years' past experience, but we are in the world's greatest depression and it does not certainly apply to the situation today. It could not.

I cannot say, but Mr. Stoll is familiar with the details as to whether the D. & R. Department of Teletype Corporation is larger or smaller than it was when the concern was taken over by Western Electric. None of the D. & R. work of Teletype, however, has been done by A. T. & T.

I am familiar with the work done in the Department of D. & R., A. T. & T. and the work done in the D. & R. Department of the Teletype Corporation is of the same general nature. It has to do with the fundamental development of Teletype, but it has entirely different activities.

[fol. 7830] ARTHUR W. PAGE, for defendants.

Direct examination.

By Mr. Haight:

I reside at Long Island; I am vice-president, A. T. & T. and have been since January 1, 1927. I was not connected with the company before that. Prior to that time I was a partner in the publishing firm of Doubleday, Page & Company, ever since I left college. My department in A. T. & T. is the Information Department. That department does the advertising and publicity for the Bell System, which is of a common nature for all of its parts. We consult with the operating companies about their public relations.

Defendants' Deposition Exhibit 109 is a photostat of the organization chart of my department. I am a director in the Southern Bell Telephone Company and am president of the Bell Securities Company and am on the committee of the Long Lines.

The Bell System Technical Journal is a publication issued regularly by A. T. & T. Likewise the Telephone Almanac and General Information. The Headquarters Bulletin is an official publication of the company. So, also, is the Bell Telephone Quarterly. All the publications listed on this chart were gotten out by our department, but they are not necessarily all regular official publications in the sense that that term is used in the publishing business. They are not all issued at stated times and they are not all necessarily entered as second class mail.

We advertise in order to promote the good will and sales of telephones and the Bell System. We place advertising in national magazines for the Bell System and those magazines circulate in the territory of each of the companies. It is advertising which applies to each particular company in its own particular area. The adver-

tising, however, does not state the name of any particular associated company.

We make no allocation of expenses as between the various associated companies. We have, however, two allocations. Long Lines pays for its own advertising and Bell Telephone Securities Company pays for all of its advertising. Otherwise we pay for the rest of our operations.

Long Lines advertising relates to long distance tele- [fol. 7831] phone service, whether it be carried on the lines of the Long Lines or associated companies. I place that advertising. I place the advertising for the Bell Telephone Securities Company, which relates generally to the securities of the A. T. & T. and some securities of the associated companies such as bonds.

I have been consulted during the last year in respect to allocation as between the associated companies and A. T. & T. of expenses of Information Department. I talked to Mr. Heiss about it two or three months or more than that ago. I made an allocation on the estimate of the time that I spent on the things that could be possibly attached to the A. T. & T. I have not an estimate here. I made an oral estimate to Mr. Heiss.

I made some memo about it. I haven't it. You will have to ask Mr. Heiss about it. I gave it to him. I haven't any copy of it. Mr. Banning and Mr. Cook helped me prepare it. I think — was signed by me. I put down on that memo the advertising that we did for Long Lines and the Securities Company. I allocated other expenses of the Information Department in addition to advertising to the Associated Companies, the A. T. & T. or the Bell Telephone Securities Company. I allocated the two pieces of advertisement I told you, outside of their particular purpose.

There were some minor costs. I think I allocated something for a half dozen or more publicity statements of finances of the American Company that we get out—quarterly statements for the company. I allocated that all to A. T. & T. I allocated to the Associated Companies expenses relating to finances, only such financial pamphlets as the Associated Companies asked for. That was to the Associated Companies as a whole.

The Headquarters Bulletin is charged in proportion as the people to whom it goes serve the Associated Companies or the A. T. & T. A separate charge was not made again

each of the Associated Companies on that, a lump charge against all and allocated as between them on the one hand and the A. T. & T. on the other.

The Bell Telephone Quarterly was allocated to the Associated Companies. Bell Technical Journal the same. Telephone Press Service the same way. It only goes to the Associated Companies. Telephone Almanac the same way as that, only goes to the Associated Companies. [fol. 7832] Except for the Headquarters Bulletin, none of these publications were in any wise charged to any entity in the Bell System other than the Associated Companies. None of these publications go to investors or to financial houses or to brokers. The Almanac goes to the Associated Companies who distribute it as they see fit. Some of these publications may go to people of the Western Electric who get the Technical Journal—their engineers. Associated Companies supply us with a list and we send them to the individuals in their company. The Technical Journal has about 2,000 paid subscribers and it is also sent to the telephone engineers and scientists abroad, who obtain scientific knowledge from it and from whom we hope to get corresponding knowledge in return. The Bell Quarterly goes to people in the Bell Telephone Laboratory and the Western Electric designated by said organizations.

In each of the Associated Companies there is a Public Relations Department, not always under that title but of that general character, and it is usually headed by a vice-president and it is his function to endeavor to see that the operations of the company are not only technically well carried on but in a manner pleasing to the public which it serves. Our relationship to those departments is as counsel to help do that and in doing so we have the usual annual conferences and also people from our department travel about from time to time and keep in touch with them constantly by telephone, etc. The expense of doing that work is allocated generally to the Associated Companies. But it is not allocated in the regular course of business. The allocation I refer to was in the memo to the operating companies as a whole.

No charge is made for the Bell Telephone Quarterly to any particular company on account of the list furnished by that company. The Bell Telephone Securities Company issues publications. I have in mind the Bell Tele-

phone Securities. That goes to bankers, brokers and stockholders who ask for them,—to whoever asks for them, such as prospective investors. It is not done, however, very extensively.

Defendants' Deposition Exhibit 110 for identification is from Bell Telephone Securities, dated April 15, 1931, the title page and prefatory note of which appears on page 3, and the article entitled "Organization and Financing of [fol. 7833] the Bell System," beginning upon page 6, terminating on page 26 and the titles, charts, maps, graphs appearing opposite several of the pages; also including the map opposite page 7, entitled "Toll Lines of the Bell System, Inc., in One Comprehensive System of Communication."

Defendants' Deposition Exhibit 111 for identification is from a Bell Telephone Securities Company issue dated April 15, 1930, and includes the chart appearing on page 14, table of statistics upon pages 19 and 20 and the subject matter and table of statistics and all matter appearing upon pages 25 to 28, both inclusive.

Defendants' Deposition Exhibit 112 for identification is from the Bell Telephone Securities Issue dated April 15, 1929, and includes two charts appearing upon page 10 and the subject matter appearing upon pages 25, 27, 28 and 29.

Defendants' Deposition Exhibit 113 for identification is from Bell Telephone Securities Issue dated April 15, 1928, and includes pages 17 to 23, both inclusive, and pages 25 to 29, both inclusive.

Defendants' Deposition Exhibit 114 for identification is from Bell Telephone Securities Issue dated April 15, 1927, and includes subject matter appearing on pages 5 to 27, both inclusive.

Defendants' Deposition Exhibit 116 for identification is from Bell Telephone Securities Issue dated May 1, 1926, and includes two charts upon page 8, one upon page 10, another upon page 11 and subject matter beginning on page 13, with the heading "Finances of the System," to and including page 16, and the charts and graphs therein appearing, and also pages 20 to 27, both inclusive, and pages 29 to 31, both inclusive.

Defendants' Deposition Exhibit 116 for identification is from the Bell Telephone Securities, issue dated April 1,

1925, and includes page 5, pages 20 to 27, both inclusive, and pages 29 to 31, both inclusive.

Defendants' Deposition Exhibit 117 is from Bell Telephone Securities, issue dated May 1, 1924, and includes the chart being on page 20 and all the material appearing upon pages 29 to 31, both inclusive.

Defendants' Deposition Exhibit 118 for identification is from Bell Telephone Securities, issue dated May 1, 1923, and includes all material appearing upon pages 5 to 22, [fol. 7834] both inclusive, and upon page 24, 26 and 27.

Defendants' Deposition 119 for identification is from Bell Telephone Securities, issue dated May 1, 1922, and includes pages 16 to 21, both inclusive, and also matter on page 23.

(In connection with each of the foregoing exhibits for identification, 110 to 119, both inclusive, the title page of each is included as part of the exhibit.)

Defendants' Deposition 120 for identification is a pamphlet entitled "Some Financial Facts About Bell System comprising American Tel & Tel. and Associated Companies," etc.

Defendants' Deposition Exhibit 121 for identification is pamphlet entitled "Others" Opinions Concerning the Investment Merits of the American Tel. & Tel. Stock," etc.

The Witness (continuing): Defendants' Exhibit 120 for identification was issued in March, 1931, by the Bell Telephone Securities Company. I have seen Defendants' Exhibit 121 for identification, but that was published before I came with the company. I think it has been distributed since I came with the company, but not very much. The other one, Exhibit 120, has been distributed continuously.

I had nothing to do with any of the exhibits except to read them as they come in. They come to me after they are prepared for my approval of their issuance, but I do not myself prepare the work or the figures.

Referring to Exhibits 120 and 121, I would say that they would be prepared by the proper people of the Bell Securities Company who are also part of the treasurer's organization A. T. & T. I do not prepare the material contained in the Bell Securities publications.

Mr. Thompson: Counsel for the defendants have sub-

mitted 11 requests with respect to the production of contracts, agreements and other written instruments from the files of the Western Electric Company.

With respect to No. 1, an agreement between the International Western Electric or International Standard Electric and the Western Electric Company, December 30, 1926, we have been unable to find any such agreement.

There is an agreement as of that date between E. R. P. I. and the Western Electric Company, a copy of which was produced by Mr. Otterson and offered in evidence by the defendants during the course of his testimony.

[fol. 7835] Request No. 2: We now produce an agreement between Western Electric and the International Telephone & Telegraph Corporation and the International Western Electric Company, Inc., dated August 14, 1925;

Also, an agreement between the Western Electric Company, Inc., and the International Western Electric Company, Inc., dated October 1, 1925.

Also an agreement between Western Electric and the International Standard Electric Corporation dated March 30, 1928;

With respect to Request No. 3: We produce an agreement between the International Telephone Sales and Engineering Corporation and the Western Electric Company, Inc., dated May 24, 1927. It is my understanding that this contract was assigned by the International Sales and Engineering Corporation on October 13, 1927, to the Automatic Electric Company. I did not understand that your request was broad enough to require the production of the assignment. However, if it is desired, I will produce it.

With respect to Request No. 4: We produce an agreement between the International Western Electric Company, Inc., and the Northern Electric Company, Ltd., dated January 1, 1919;

Also an agreement dated August 27, 1919, between the International Western Electric Company and the Western Electric Company, Ltd.;

Also an agreement dated May 16, 1923, between the American Telephone & Telegraph Company, the Western Electric Company, Inc., the International Western Electric Company, Inc., the Northern Electric Company, Ltd., and the Bell Telephone Company of Canada, Ltd. It is my understanding that this has been assigned to the Western Electric Company as of September 30, 1925, the date when th

Western disposed of its holdings in the International Western Electric Company.

Mr. Goldstein: May we have that assignment?

Mr. Thompson: I see no reason why we won't produce the assignment, although I do not understand that it was covered by the scope of your request.

With respect to Request No. 5: We produce agreement dated October 11, 1928, between the Western Electric Com-
[fol. 7836] pany, Inc., and Graybar Electric Company, Inc.

With respect to Request No. 6: We produce an agreement between the Western Electric Company, Inc., and Stromberg Carlson Telephone Manufacturing Company dated August 13, 1923.

With respect to Request No. 7: We produce an agreement between the Western Electric Company, Inc., and the International Telephone Sales & Engineering Corporation dated March 21, 1924.

With respect to Request No. 8: We produce first, an agreement between the Western Electric Company and the International Telephone Sales & Engineering Corporation, dated March 26, 1931, but inasmuch as this agreement refers to an earlier agreement and perhaps incorporates a part of its terms, we have also produced the earlier agreement between the two companies dated June 19, 1919.

With respect to Requests Nos. 9 and 11, referring to agreements between the Western Electric Company and Kellogg Switchboard & Supply Company and the Stromberg Carlson Telephone Manufacturing Company, covering basis of prices, we will have that information within a day or two and we will give it to you.

With respect to Request No. 10: We produce the following agreements between the Western Electric Company and the Kellogg Switchboard & Supply Company covering licenses and patent grants between the two companies covering the period between 1914 and 1930, both inclusive.

With respect to these agreements, I want to state for the record that so far as we have been able to discover, these are all the agreements we have, but the period inquired about is rather an extensive one, and I am not going to state on the record that there may not be other agreements which we may not have. These agreements are as follows:

One dated June 2, 1914; one dated August 3, 1923; one dated September 22, 1923; one dated November 16, 1923;

one dated January 26, 1927, and one dated February 9, 1927.

At the time Mr. J. E. Otterson was on the stand three requests were made of him to produce contracts and form [fol. 7837] of organization chart. I now produce in respect of Request No. 2, made of Mr. Otterson, an organization chart of E. R. P. I. which has been prepared in accordance with the agreement made with counsel for the defendants, so as to bring it down to date. It is in typewritten but not in printed form.

I also produce a form of contract between E. R. P. I. and Exhibitors of Motion Pictures;

Also a blank form of contract between E. R. P. I. and Recording Licensees;

Mr. Blackman: I have looked through this memorandum and there is only one thing on it that I think I will not furnish and that is the minutes of the meetings of the Board of Directors, A. T. & T. and the minutes of meetings of Executive Committee, A. T. & T. Those are Nos. 3 and 4 on page 7 of your memorandum, Mr. Adcock.

All the other things, I do not think there is any doubt about our furnishing. As you know, Mr. Bracelen has been ill for the past two days and I want to speak to him, because he has general control over the matter, but so far as I am concerned, I think we will agree that all the others will be furnished.

Mr. Blackman: I may say as to objections to materiality and relevancy, if there is any objection, they will be properly made, but no objection will be taken on the ground that they are not copies of reports put out by the company which purported to put them out. In other words, you will not have to prove that they were published in any particular journal or that that journal was published by the A. T. & T. or the Western Electric, as the case might be. There is one other thing I see here that I shall advise be not submitted. You are asking for all the publications of the Long Lines Division. I shall advise that that be not furnished.

EDGAR S. BLOOM, recalled:

I have read an article appearing in the Western Electric News, issue of January 1929, at page 326, about which article I was asked when I was on the stand before. This article correctly presents my views.

[fol. 7838] PIERRE W. SAXTON, recalled.

Direct-examination.

By Mr. Haight:

CR. 56, 58, 59, 73, 74, 75, 77, 78, 79, 80, 81, 82, 83, 84 and 85 have not been used. In 1923 there was a CR 68 which was entitled "Cash Estimate." In 1923 to 1926, inclusive, there was a CR-69 entitled "Advances, Bills Payable and Coupon Notes." In 1923 and 1924 there was a CR-70 entitled "Plant Purchased or Sold." In 1926 to 1930 there was a CR-93 entitled "Revenue Accounting Expense Report."

Provisional estimates of the Associated Companies are distributed, one copy to the official file, one to President Gifford, one to Mr. Heiss, one to Mr. Saxton, one to Mr. Behan, Uhrig, Andrew, Hamilton, Gherardi, Waterson, Wlodeck; five to Mr. Wilkinson, O. & E. Department, who is under Mr. Gherardi. Mr. Waterson is in Gherardi's organization.

I have forms of provisional estimates used by Illinois Bell for years 1919 to 1930, both inclusive. The instructions are contained in the forms themselves and appear as general notes on the back of the first page, and there are certain sheets in the estimate entitled "Explanation of Statements." I am referring to the form for 1919. I have not looked through all the forms.

I believe there is a letter of transmittal sent by the President of the company. The forms are transmitted to the presidents of the Associated Companies. I never heard of that letter referred to as the letter of instructions. Those letters are not sent out by our department. I think they are sent by the president, Mr. Gifford, and that letter is referred to as the letter of transmittal. There may be letters of instruction that come from various departments, or various staffs, referring to the manner in which these provisional estimates are to be made out, but I don't know. If there have been such letters, they have probably been sent by the department of O. & E.

The forms of provisional estimates produced were offered in evidence and marked Defendants' Deposition Exhibits as indicated below:

[fol. 7839] For the year 1919—Defendants' Deposition Exhibit 122.

For the year 1920—Defendants' Deposition Exhibit 123.

For the year 1921—Defendants' Deposition Exhibit 124.

For the year 1922—Defendants' Deposition Exhibit 125.
For the year 1923—Defendants' Deposition Exhibit 126.
For the year 1924—Defendants' Deposition Exhibit 127.
For the year 1925—Defendants' Deposition Exhibit 128.
For the year 1926—Defendants' Deposition Exhibit 129.
For the year 1927—Defendants' Deposition Exhibit 130.
For the year 1928—Defendants' Deposition Exhibit 131.
For the year 1929—Defendants' Deposition Exhibit 132.
For the year 1930—Defendants' Deposition Exhibit 133.

The Witness (continuing: In connection with my previous testimony I said that we prepared a combined provisional estimate for the Bell System including Associated Companies and Long Lines in general. As a matter of fact, the combined provisional estimate is for the Associated Companies only. The distribution of the combined provisional estimate is as follows:

One copy to the official file, one copy to Mr. Gifford, Cooper, Heiss, Saxton, Behan, Uhrig, Andrew, Hamilton, Cogan (he is in my organization), Gherardi, Waterson and Harrison (he may not have been identified—is in O. & E. Department); one to Mr. Anthony (also in O. & E. Department), Burcher (O. & E. Department); one to French (O. & E. Department); one to Crunden, assistant comptroller American Company; one to Wlodeck, Wilkinson and one to Mr. McHugh of O. & E. Department.

There is a form of combined estimate for the Associated Companies, which is a summary, which I have just referred to as distributed. That form has no number but it is simply a combination on the same form as are used by the companies.

Defendants request plaintiff to produce the combined provisional estimates for all the Associated Companies for each of the years 1919 to 1930, both inclusive, which request was taken under advisement.

[fol. 7840] Cross-examination.

By Mr. Blackman:

I know practically nothing personally of the operations of the New England Telephone Company. The reports of the company are kept in my department and aside from the reports that are sent periodically by that company to my division, I don't know anything about its income and invested capital and matters of that kind.

Redirect examination.

By Mr. Haight:

Those reports referred to, come to my division in the regular course of business and upon regular forms provided for that purpose. They are used by us for preparation of our own reports, such reports as I have already testified are made.

Mr. Blackman: Mr. Haight, in order to make this clear and to avoid any unnecessary further examination, I am not casting any reflection on the authenticity of the reports at all. My point is simply directed to this and I will make it plain on the record so that you will understand. In answer to a question by you the witness said he could refresh his recollection or refresh his knowledge of the income of the New England Company by examining the reports. I am making the point that he cannot refresh his recollection or knowledge because he never had any, that all he can do is to tell you figures that show on paper that is in his department.

Mr. Haight: All right.

JAMES F. BEHAN, recalled.

Direct examination (continued).

Mr. Mr. Haight:

Defendants' Exhibit 134 for identification is a tabulation showing the benefits to A. T. & T. resulting from consolidated income tax returns. At the bottom of the sheet is a statement "Notes, 1. Companies having deficits failing to pay dividends to the American Company." In 1918 there were companies who had deficits and did not pay [fol. 7841] dividends. The fact that no dividend was paid to the American Company is not taken into account in arriving at the figure of $196,286.17, which purports to represent the net amount of benefit to the American Company for the year 1918. The amounts shown on the sheet represent the savings to A. T. & T. without taking into account any loss to it as a result of the failure to receive interest or dividends from those companies. A distinction is drawn between the years 1918-23 and between the period 1923-30, inclusive, because our returns for the period 1918-23 are

closed with the Department at Washington, final settlement having been made. All of the other years are still open and still subject to discussion, so we don't know the final amount of taxes for those years.

In connection with the settlement for the years 1918 to 1923, we made additional payments over what had been paid originally, based on the return as filed.

Plaintiff's counsel refuses the request of defendants that witness produce the figures showing the additional payments for each of the years 1918 to 1923).

The additional payments were based upon the additional assessment for the consolidated group and the additional assessment, of course, could be allocated to the companies. We have made such an allocation to the various companies.

(Witness states that he will furnish subect to direction of counsel, statements showing such allocations.)

Each company that was involved in the additional assessment was billed for these additional payments. Some of them may not have been involved. As to whether the additional payments made by each of the companies in connection with their respective returns is reflected in the statement contained in Exhibit 134 for identification, I will say that the statement does not purport to reflect payments to the extent of the additional payments. It affects the final return.

The figure $196,286.17 for the year 1918, appearing upon the said exhibit, was determined by taking the final figure after audit by the Internal revenue department. To compute said figure, we took the final amount of tax which the A. T. & T. would have paid on an individual basis and deducted from that the amount of tax which it actually paid on a consolidated basis, and the difference is the benefit to [fol. 7842] A. T. & T. from the consolidation. We do not figure in such computation on any or all of the companies whose income we use in the consolidated income tax return, what each of the companies would have paid on an individual basis and what each of the companies was billed and paid on a consolidated basis. All we figure was the difference between what the American Company would have paid and what it did pay.

Defendants' Deposition Exhibit 134 for identification was offered and received in evidence as Defendants' Deposition Exhibit 134.

CLYDE UHRIG, recalled.

Direct examination.

By Mr. Haight:

With reference to bond discount and expense on the three issues I have mentioned in my original testimony, I was asked to make certain segregations, which I have done, and they appear upon Defendants' Exhibit for identification 135, entitled "American Telephone & Telegraph Company," etc.

I have here, in connection with CR-14, a document consisting of two sheets entitled "Cash Statement for years 1918 and 1919" which is marked Defendants' Deposition Exhibit 136.

I have the same CR-14 Report for the years 1920 and 1921 (2 sheets) which is marked Defendants' Exhibit 137.

I have also produced CR-18, consisting of a plurality of sheets covering the years 1919 to 1930, both inclusive, which is marked Defendants' Exhibit 138; also CR-10 for the years 1919 to 1930, both inclusive, which is marked Defendants' Deposition Exhibit 139.

(Said Exhibits 136-139, inclusive, were offered in evidence by defendants.)

The figures shown on CR-16 which I have produced, entitled "Final Cash Estimate December, 1919"—"Balance Nov. 30, 1919—$70,039,000" were estimated receipts for the month of December, 1919. I have no compilation or statement showing the estimated receipts by the classes shown on CR-16 for the entire year 1919. I probably have no com-
[fol. 7843] pilation, corresponding to these classifications.

I think we have a statement which shows the estimated receipts and the estimated disbursements for each of the years 1919 to 1930, but the subdivisions would not necessarily conform to those on CR-16. I would not say, however, we have estimated receipts and estimated disbursements by some classification for those years. An estimate undoubtedly was made, but whether it was preserved or not, I don't know. Doubtless we have sheets corresponding to CR-16 for each of the months for the years 1919 to 1930.

(Defendants' request that witness produce for each of the years mentioned, in the alternative, either a statement showing the estimated receipts and estimated disbursements by subdivisions, or produce the monthly reports

CR-16 for each of the months of each of said years, was taken under advisement by plaintiff.)

CR-13 is a report compiled in my department, which report is the Allotment Report.

(Request to produce Report CR-13 for each of the years 1919 to 1930, inclusive, taken under advisement.)

Mr. Blackman asked whether that was a report already furnished to defendants. Mr. Goldstein stated it had been furnished for inspection only and no copies could be made every time he got part of the information in Chicago.

The Witness (continuing): Defendants' Deposition Exhibit 140 received in evidence is a chart showing certain CR Reports that had once been in use and were no longer in use.

SEYMOUR L. ANDREW, for defendants:

Direct examination.

By Mr. Haight:

I reside at South Orange, New Jersey; I am chief statistician, A. T. & T. and I was thoroughly educated at Harvard College. I have been in charge of my division since 1921. My division furnishes advice and assistance in the development and prosecution of the statistical work of the accounting departments of the associated companies and of work related to that statistical work.

The words "Methods of Statistical Analysis and Pre- [fol. 7844] sentation" appearing upon the organization chart of my department—Defendants' Deposition Exhibit 51, refers to methods and we endeavor to assist the associated companies in the development of methods whereby the data in the underlying records may be most clearly, quickly and concisely made usable for administrative purposes of the Associated Companies. That work has nothing to do with the administrative purposes of the Bell System as a whole or the work of A. T. & T. except in so far as the methods may also be allocable to the work of the other departments of the general staff and are used by them.

The words "Statistical Methods of administrative control" relate to the administrative control exercised by all supervisors of the associated companies. It is not designed for the purpose of the organization of A. T. & T., and does

not relate at all to the administrative control exercised by A. T. & T.

As an instance of statistical methods of administrative control we have developed "Development of a job control book." That is, we suggest to the associated companies the form whereby statistical data may most readily be kept for day-to-day use by a supervisor in those companies. The development of the job control book is a continuing piece of work. I have forgotten when the start was made on that, but of course the need for statistical control methods and devices has become greater as the size of the system has become greater.

Job control means the control of the functions under the immediate direction of the supervisor, the object being, of course, so that every supervisor can have the statistical information relating to his job in the easiest and best form.

On the control charts, Defendants' Deposition Exhibit 51, there appear the words "Mathematical statistics," which relates to assistance rendered to the associated companies involving problems regarding the use of so-called higher mathematics. Such problems are not to any appreciable extent before me in connection with work of A. T. & T. as such, but we are asked occasionally by other members of the general staff for advice on problems involving higher mathematics. The work is not of a character where results can be sent. If there are problems that come up the general procedure would be to have the associated companies send [fol. 7845] some one in to discuss them. No reports are made as a result of such discussion. The general staff ask for information of the same sort on which we consult and give advice only as I have already said.

I am not, however, immensely familiar with other departments requiring mathematics. A number of them, of course, have their own mathematicians.

I cannot state how many representatives of Illinois Bell have come to my division for advice in relation to mathematical statistics since I have been in charge. We do not keep a record of that. I have no recollection offhand, but I might say that mathematical statistics is a very small fraction of our division.

In regard to which one of the topics appearing under my name, "Chief Statistician," on Defendants' Exhibit 51 represents the largest part of my division work, I would say

that the real classification of the functions of the division does not closely tie up with the particular language used in this chart. For example, the main function of the division is with reference to the development of statistical methods. Work of that character is carried on by each of the sections shown in these charts. Those methods do not relate to the making out of reports that go to the Associated Companies, but they relate to methods of summarizing, analyzing and presenting the underlying data of the associated companies for their own use. It does not include anything that relates to the making out of reports of those results to A. T. & T. I presume, however, that underlying data used in the making out of reports by associated companies to A. T. & T. is in some wise used. It, however, has nothing to do with the provision of the original data. It relates to methods of analyses and presentation of the data after it has been originally compiled. So far as I know, portions of it are presented in monthly reports to the A. T. & T.

Under the heading "Pension and Depreciation Studies" on Exhibit 51, we compute each year for each of the associated companies the proper accrual expense which they should charge to meet the undertaking to provide pensions in accordance with the terms of the pension plan of the Associated Companies. It relates to Long Lines but not to Western Electric or E. R. P. I. My division has nothing to [fol. 7846] do by way of cooperating or giving advice relating to pension funds to Western Electric. Nothing of a formal character. They provide their own accruals and compute them. I should not be surprised, however, if the people engaged in that work talked with our people from time to time.

Mr. R. W. Burgess, chief statistician of that company, worked out the Western Electric method. Our method was worked out in my division. I think both methods were worked out simultaneously. There was presumably cooperation of the character I have stated.

"Depreciation Studies" relates to the study of *of* those aspects of proper depreciation procedure which involves the use of mathematics. In the determination of service life of various classes of property the use of mathematical formulae and mathematical procedures are involved.

We have advised Associated Companies in respect to their use and appropriateness. In so far as the form con-

ceived by my division is applicable, they all use it. The form is applicable to those classes of telephone property for which experience as to service life is available. I don't know when that was started, but it was before 1929. I cannot tell when I recommended the use of formulas based upon experience. I cannot say as to whether it was after my original connection with my division. Of course our work in connection with recommending formulas upon the service life for the various associated companies is in the nature of research work. The recommendations go out by other people than ourselves.

As to the persons to whom recommendations go, we work with the proper people in the department of O. & E. as well as with the comptroller. We give them advice with respect to the mathematical processes involved. For example, studies were made in our division as to the type or types of mathematical formulae which might best fit the mortality experience of certain types of plant. Our conclusions as a result of those experiments and research along that line were forwarded to Department O. & E. and to the comptroller. That happened some years ago, I do not recall the exact date, but I will find out the date and let you know. That advice and the studies were based upon the experience of more than one of the associated companies, but I cannot say with exactitude as to the number.

[fol. 7847] At first hand I cannot say whether the formula based on service life that I have referred to, is now used by the Illinois Bell. As to the particular name by which the formula is designated, it seems to me that I have heard the name Gompertz-Makeham in connection with it. My impression is my division had nothing to do with the formulation of that law or formula, but in connection with that formula we undertook studies to determine whether or not it was applicable in the case of the mortality experience of classes of telephone property.

As to whether my division did work in computing the mortality of this property in the service on the basis of this formula, I will say that we were not after results. We were after methods of obtaining results.

As to whether we did anything else in connection with service life from the time I entered the division except what I have stated, I will say that I believe that members of the division have advised in respect of methods for determining service life where a formula of this character would not

apply. That is in those classes of property where this formula would not apply. I presume advice was given with respect to such classes of property. I do not remember what it was.

I cannot answer the question as to whether we made any studies or gave any advice in regard to the element of salvage relative to the subject of depreciation.

I do not think we used monthly reports of the associated companies in connection with any of these studies or recommendations that I made, but we did receive data as to the associated companies' past experiences with respect to certain classes of property upon which those studies were based. The reports used were in terms of physical units. I don't think we used any monthly reports of the associated companies that have been referred to as numbers 1 to 7, both inclusive, and number 28 or 22a, 22b, 22c, but I will check that and be certain. We do use in some of our work some of the C. R. reports in general relating to the associated companies and not reports relating to A. T. & T. We make use of the monthly reports of the associated companies for things other than depreciation.

In connection with our methods of work, we use monthly reports MR-1 to 7, both inclusive, MR-23, 22b, 22c and the [fol. 7848] special report on which CR-91 is based, but I do not think that advice and recommendations to the Illinois Bell and to O. & E. Department and to the other associated companies is based upon the above mentioned reports or upon studies based upon said reports. The reports enter into our work by keeping us advised as to the size and condition of each of the associated companies, which has a bearing upon the method which we may suggest to them as to the bearing. I will say that the methods which we might suggest for consideration in a small company would probably be somewhat different in detail from the methods suggested for use in a large company. In the way in which I have said, when we make determinations and give advice based upon studies, where that advice relates to the large companies we use the information from these various reports relating to such large companies. That is, the use that we make of them is not related to the advice that we give in respect to methods; in other words, to make that clear, we do prepare for certain officials and other members of the general staff of this department, some graphical presentations in which the data from those reports is used. In

the way that I have already stated, we do use in giving the advice the facts stated in the report from the associated companies relating to their affairs and the advice has some relation to the facts stated in the reports.

We use them in preparation and maintenance of certain graphic reports sent to other members of the general staff, the graphic reports going to Mr. Gifford, Cooper, Gherardi, Heiss and one or two of the members of Gherardi's organization. I presume my division gives advice or recommendations that are divisions of methods of what has gone before. In the same way and to the same extent as I have explained, those recommendations based on the same reports have the same relationship to the reports as I have already stated.

I don't know whether we use CR-52 entitled "Associated Operating Companies, including A. T. & T., Long Lines Distribution of Total Net Earnings for Month of —." I don't think we use CR-53A nor CR-54. As to CR-54A, I cannot be absolutely sure nor as to 67A. The only use, however, which we would make of any or all of such reports would be in connection with the making or posting of a few charts [fol. 7849] maintained for the other members of the staff, but I cannot say what if any use is made for that purpose.

My division has 115 employes. It does not have anything to do with the study of fundamental plans. We receive, however, copies of provisional estimates. We do not have anything to do with their preparation.

I think the heading on chart, Defendants' Deposition Exhibit 51, relating to the Comptroller's Department, relating to five-year budgets, is largely a misnomer. It was put there primarily for the purpose of having something over the name of the fellow that appears under each. We are in a little difficulty once in a while in showing coordinate members of the organization and then devising some title to apply to them. Of course in the field of general statistical methods is involved methods of estimating, and it is in connection with that, that that term is used.

Also on Defendants' Deposition Exhibit 51, there appears the heading "Economics Statistics" and under Mr. Belcher is "Financial Studies," which title appears above the name of Mr. Hodgkinson, Jr. That entire group is concerned with the study of current business conditions in the economic world outside of the telephone company. There again we have a case of two coordinate individuals in that

group and we call one of them "General Economic Studies" and the other "Financial Studies."

In connection with those we take certain periodicals and so-called economic service, but we do not use any manuals such as Moody's, Poor's and Standard Statistics in connection with them. It is quite possible occasionally that we do consult those manuals in connection with our work. Our library subscribed for them and they are available in the library for any one in the company who wants to refer to them, and I think they are referred to by people in my division, but I have never seen them in actual use, and I would not be apt to because if they are used they are used in a different office. We have a general library in the Comptroller's Department which is available for all of those who wish to consult any book in it, and books are consulted for the purpose of obtaining information. The use of the material by others in the company would indicate that the library serves a useful purpose and is worth what it costs. As to the useful purpose, I cannot say in detail. I can state [fol. 7850] the general philosophical conclusion but in my judgment it is desirable for persons connected with a large organization to have reasonably ready means of acquainting themselves or continuing to be acquainted with a fair amount of what goes on in the world outside of their immediate day-to-day job.

Referring to Defendants' Deposition Exhibit 51, under the heading "Chief Statistician" the first of the subdivisions is entitled "Industrial Surveys and Population Studies." That group advises the associated companies when called upon in relation to questions involving the present or prospective population in their territory and in respect of any studies which they may undertake looking toward an industrial survey, so-called, in any part of their territory or in the territory as a whole, those surveys being undertaken for the purpose of aiding the judgment as to what the probable future industrial development of those areas will be.

The subdivision headed "General Economics Statistics" concerns itself with the study of current and prospective business conditions outside of the telephone business and to furnish studies to the Associated Companies based on the results of these studies and with advice and assistance to the associated companies in their own study of business conditions in their respective territories.

The subdivision under the heading "Financial Studies" is engaged in the same character of work as the preceding subdivision except that it pays somewhat more attention to the study of banking conditions and security markets. In our studies of finances and conditions of the bond market and conditions of the stock market, etc., we use the services of Moody's, Poor's, Standard Statistics, but not the manuals. There are other services of that kind. We use those services and have the manuals in the library in my division.

Stipulated that the notary need not observe the order of December 4, 1931, requiring the depositions to be returned to the clerk of the court on or before February 1, 1932, but that it could be done later, on or before February 16, 1932.

Stipulated that original exhibits identified or offered on the taking of depositions, may not be returned by the Commissioner, but the exhibits may be used as identified when the depositions are offered, subject to defendants giving to plaintiff, on request, copies of any of the exhibits that they [fol. 7851] may desire, or giving them the originals.

Defendants' Deposition Exhibit 141, being a list of certain patents appearing in report of the Federal Trade Commission to Congress, entitled "The Radio Industry," received in evidence, subject to plaintiff's right to correct if errors are discovered.

Mr. Adcock: At the end of Mr. Otterson's redirect examination we requested the audits of Arthur Young & Company of E. R. P. I. which Mr. Otterson testified had been made by Arthur Young & Company and I think the letter of Mr. Bracelin of January 19th states, as a matter of fact, that there were no audits made and that request——

Mr. Bracelin: Did I say that?

Mr. Adcock: There were no reports made, yes, no reports made, and we wanted the audits made at that time, as stated by the record, in order to save time and for that reason we will probably want to recall Mr. Otterson to ask some questions about that situation, not particularly about the audits, but with reference to the subject-matter that would be covered by the audits.

Form of provisional estimate for year 1931 received in evidence as Defendants' Exhibit 133½, subject to plaintiff's objection as to materiality and relevancy.

With respect to Defendants' Exhibits 110 to 119, both inclusive, offered in evidence, defendants offer the following with reference to each one of those exhibits:

Exhibit 111—Prefatory note on page 3, chart appearing opposite page 7 and pages 7 to 28, both inclusive, not heretofore offered.

Defendants' Exhibit 112—Prefatory note on page 3, chart appearing opposite page 7, and all material appearing on pages 7 to 29, both inclusive, not heretofore offered.

Defendants' Exhibit 113—Prefatory note and chart appearing opposite page 8, and all the matter and material appearing on pages 9 to 29, both inclusive, not heretofore offered.

Defendants' Exhibit 114—Front and back of sheet 3, which is the sheet immediately preceding the table of contents and chart opposite page 5.

Defendants' Deposition Exhibit 115—Matter and material appearing on inside of cover page; material appearing on page following the cover page and all material appearing [fol. 7852] on pages 5 to 31, both inclusive, not heretofore offered.

Defendants' Exhibit 116—Material appearing on inside of cover page and material on sheet following the cover page and of pages 5 to 31, both inclusive, not heretofore offered.

Defendants' Exhibit 117—Material appearing on the inside of cover page and material appearing on page following the cover page and all matter appearing on pages 5 to 31, both inclusive, not heretofore offered.

Defendants' Exhibit 118—Material appearing on inside of cover page and material appearing on the page following the cover page, and all material appearing on pages 5 to 31, both inclusive, not heretofore offered.

Defendants' Exhibit 119—Material appearing on page following the cover page and all material appearing on pages 5 to 23, both inclusive, not heretofore offered.

The defendants offer with respect to each Defendants' Deposition, Exhibit 111 to 119, both inclusive, plaintiff objected on the ground of immateriality, irrelevancy and incompetency, but not to the authenticity of the documents.

HARRY H. CARTER, recalled.

Cross-examination.

By Mr. Blackman:

The Illinois Bell has done sales work in connection with Long Lines special service contracts for approximately a year, and sold during 1931 approximately $5,000 to $5,100 worth. The Long Lines' own sales force in that year did a million twenty to a million thirty-five thousand dollars worth.

About a year ago, Illinois Bell organized a group to sell their toll and special contract services and asked Long Lines to train that group, which was done under my supervision, sending a man to Chicago to train the group and work with them for a matter of a month or six weeks on one occasion; later, at Illinois Bell's request, man was sent there for 2 or 2½ months to carry on further work with the group.

Long Lines' sales organization that has been in Chicago for a number of years did all the selling of special services. However, if an Illinois Bell employe got in touch with some [fol. 7853] one who desired Long Lines special services, that fact would be reported to our sales organization and further negotiations would be carried on by it. Prior to a year ago, Illinois Bell had three people who were exclusively working on its special contract service sales. During the years Long Lines has had a sales force in Chicago, it has sold services for Illinois Bell which was done as a part of Long Lines own selling work. If we found people who were interested in Illinois Bell special services in addition to our own, Long Lines people would make the sales as the opportunity presented itself.

To sell special contract services requires a study of the customer's communication needs, and our studies sometimes would show that Illinois Bell special services were the only ones required. Sometimes a combination of Long Lines special service and Illinois Bell's were needed. In other instances Long Lines alone; that is, each of the two companies gave the same kind of service.

When I said at page 482:

"They can handle the applicant for service and can go to them and they can negotiate for sale of the service that he desires." I meant Illinois Bell Company's special contract services. The only services that Long Lines covers by con-

tract are special services shown on special forms. The forces of the Western Electric Company are included in the special sales campaign that I refer to.

The employes of the Illinois Bell are not really in a position to sell for us any services because to sell special contract services it requires a considerable amount of tactical knowledge, and the employe body of the Illinois Bell does not have that knowledge. Our sales are generally to very large concerns, such as banks, large manufacturing establishments, and the employe body as such would not have contact with the type of concern; so that the opportunities to sell special services are rather remote on the part of the employes generally.

The Illinois Bell would profit from the general sales campaign which I mentioned to a very considerable extent, because Long Lines employes and Western Electric are familiar with the various forms of exchange service offered by Illinois Bell and have contacts daily with their neighbors and friends who are likely prospects for additional services or new services entirely of Illinois Bell. It is comparatively [fol. 7854] easy for employes in Long Lines and in Western Electric because of such familiarity. Long Lines employes in Chicago are not really engaged in selling toll service because there is no contract taken for toll. Contracts are only in connection with special services. Toll service is promoted by advertising. The commercial employes of Long Lines at Chicago are on the Long Lines payroll. As to other employes in Chicago, I have not any direct actual knowledge as to whose payroll they are on.

The Long Lines Department has two continuing program special services furnished to the National Broadcasting Company and one to the Columbia Broadcasting Company. The National furnishes service to five stations in the Chicago area and Columbia to two stations in that area; so there are three program special services into Chicago over which broadcasts are sent to seven broadcasting stations in the Chicago area who are over Long Lines to the boundary line.

At the boundary line, the Long Lines plant and the plant of the Illinois Bell are connected, which extends to the studios of the broadcasting companies and from the studios the Illinois Bell's plant is used out to broadcasting stations. The Illinois Bell furnishes all the facilities required within the City. The Illinois Bell furnishes continuing program

special services to 14 stations in the Chicago area and no part of the Long Lines plant is used in that service, the Illinois Bell getting all the revenue and maintaining the service.

A continuing program special service is one furnished for any 16 hours continuously daily. Along the route of the facilities there are terminal rooms and repeater stations in which men stand by and observe the quality of the service, seeing to it that the lines and transmission levels are maintained and making all necessary adjustments and supervising to keep the program facility in condition to satisfactorily deliver the program to the radio stations.

There is also a temporary recurring service which is furnished so many hours a day or so many days a week or so many days a month, and in addition to that there is a service furnished for one time only—a half hour or an hour or a 2-hour basis, which is not a recurring service.

Long Lines has at the present time two recurring serv- [fol. 7855] ices going into Chicago and it has had on various occasions one time jobs where our plant is used to the city boundary and then connected to the Illinois Bell plant for the recurring service or for the one time service. The facilities and instrumentalities for the recurring service and for the 16-hour are the same and generally the same also for the one night. The Illinois Bell furnishes the facilities exclusively on service within the City of Chicago. Special services in Chicago with relation to aircraft operation, toll service and teletype service is furnished in co-operation with Illinois Bell, and Illinois Bell furnishes similar services without our co-operation.

Redirect examination.

By Mr. Adcock:

I have certain information that was requested by defendants with reference to revenue of Long Lines.

Defendants' Deposition Exhibit 142, is a statement covering period from July 1, 1919, to December 31, 1930, showing gross revenue from Long Lines business, together with the Long Lines' share in each case, subdivided first between revenue from message toll services and special contract services, and the latter services subdivided according to the various kinds of those services in effect in the respective years. The term "gross revenue" as used on this statement indicates the amount charged the users of the service.

However, the difference between this amount and the amount shown as the Long Lines' share does not represent the entire compensation to other companies for services and facilities furnished by them in connection with this business. To a very large extent compensation to them for facilities furnished is on a rental basis rather than on a pro rata basis. In such cases the rental payment is included in the Long Lines' expenses as a rent deduction. Similarly, compensation to other companies for operating services furnished by them are, to a large extent, reflected in the Long Lines' operating expense account rather than as charged against gross revenues.

Defendants' Exhibit 142 is a correct statement of the matters therein shown as taken from the books of A. T. & T. Defendants' Deposition Exhibit 143, dated January 1, 1931, is an organization chart of the Long Lines Depart- [fol. 7856] ment. During the 4½ years that I have been in Long Lines Department, there have been certain changes not only in personnel but additional offices. I refer to a commission going to the Illinois Bell in connection with Long Lines' special contract services. The Commission was accepted by Illinois Bell on June 30, 1930, and became effective July 1st of that year. There was correspondence between Illinois Bell and Long Lines on that subject, copies of which have been furnished us.

With reference to article in Bell System Technical Journal of January, 1930, entitled "Telephone Systems of the United States," to which Dr. Jewett's attention was called in his testimony, Dr. Jewett states as follows:

"I have reread the article prepared by Mr. Gherardi and me for the World Engineering Congress in Tokyo in October 1929 entitled 'Telephone Communication System of the United States' and reprinted in the January 1930 issue of the Bell System Technical Journal. I think that the article correctly portrays as of 1929 the material covered by it.

I think likewise that it correctly portrays the facts, statistics and forecasts as of the present day except only in so far as these have been modified by progress and developments that have occurred during the past two years or by the altered forward picture which has resulted from the changed economic situation.

Of course there are certain parts of the paper, particularly those relating to commercial and operational matters,

in which Mr. Gherardi's opinion is better than my own since they relate to matters with which he is more conversant than I.

While the paper undertook to give an accurate picture, as of 1929, of the telephone communication system of the United States, in a limited space, it must be read with an understanding of the occasion on which it was presented and the audience to whom it was presented.

The occasion was a World Engineering Congress called together for the purpose primarily of reporting on new and outstanding engineering advances in the period since the last preceding international congress. The audience to whom the paper was presented was composed of leading communication engineers from all the principal countries of the world.

Because of the nature and stated purpose of the Congress [fol. 7857] and the character of the audience, the paper which Mr. Gherardi and I prepared was not and was not intended to be, as regards the amount of space devoted to the various topics mentioned, an accurately balanced presentation of the research, development and engineering effort that had been or was being expended in the United States.

Since the development of purely local telephone service is involved with many purely local considerations, detailed description of one country's practice is frequently of little interest to the communication engineers of another country—for example, the vast problems of research, development and engineering involved in the introduction of panel type machine switching in the United States are only of general interest to communication engineers elsewhere in the world.

On the other hand, all communication engineers are interested in the problems of longer distance telephony and telegraphy, in international services and in the development of adjunct services.

For these reasons, and also because longer distance services have developed most rapidly, relatively, in the past few years and have involved more radically new things than strictly local telephone service, the portions of the paper dealing with these features of the communication system of the United States are more elaborate in detail than are the other portions of the paper."

Mr. Blackman: With regard to matter about which he was interrogated, Q. 191 and Q. 192, p. 319 of the record, Dr. Jewett states:

"I have read over Dr. King's article and I have no comment to offer, as I think it sets forth quite accurately the situation as it existed at the time it was written."

With regard to the matter about which Dr. Jewett was interrogated by Q. 196, record p. 322, Dr. Jewett states:

"I have read Dr. Osborne's article and have no comment to make. It sets forth correctly the general principles on which standardization in the Bell System is applied. The limited number of illustrations given are, I think, correct, as of the time the article was written and would today be modified only in detail, as a result of subsequent progress."

With regard to the matter about which Dr. Jewett was interrogated by Q. 197, record p. 323, Dr. Jewett states:

[fol. 7858] "I have read the marked parts on pages 545, 552, 553 and 554 of Mr. Pennock's article in the October 1925 number of the Bell System Technical Journal. The statements are in accordance with my general understanding, although I am not sufficiently conversant with the details of shop planning or shop operation to make specific comment on the accuracy of the figures used in Mr. Pennock's illustrations."

With regard to the matter about which Dr. Jewett was interrogated by Q. 205, record p. 329, Dr. Jewett states:

"I have reread the article which I prepared for the Western Electric News, the house organ of the Western Electric Company and which appeared in the issue of January 1919. I have also reread Mr. Vail's letter of December 11, 1918, to the Postmaster General and his letter of December 16th to Mr. Gherardi and me, which form part of the article. As a popular presentation of a new and highly technical development I think that the article is an accurate statement of the art as it existed at the time the article was written. A similar article and similar letters on the same subject, written at the present time, would undoubtedly employ different illustrations regarding the number of telephone and telegraph channels which it is economical to employ in multiplex operation and different and

much shorter lengths of line over which it is economical to employ them. This is because in the 13 years which have elapsed since the article was written very considerable advances have been made as a result of continued research and development work."

With regard to the matter about which Dr. Jewett was interrogated by Q. 205, record p. 329, Dr. Jewett states:

"I have reread the article 'The Engineering Department of the Western Electric Company' which I wrote for the June 1914 issue of that company's house organ, the Western Electric News. I think that this article, which was designed to acquaint the employees of the Western Electric Company with the general work of the Engineering Department, correctly represents the organization and work of the Engineering Department as it existed in 1914. There is, however, one sentence in the article which taken in connection with the preceding sentence is not strictly accurate. Thus sentence at the top of the second column on page 3 reads as follows: 'This service trial is under the direct supervision of *of* the American Telephone and Telegraph and Western [fol. 7859] Electric engineers and is designed, not only to make sure that no service conditions have been overlooked, but also to develop any points of mechanical weakness which may not have been discovered in the preliminary laboratory tests.

The statement is accurate so far as concerns the trial installation of developments undertaken in the interest of the Associated Companies. In the case of developments which were then undertaken in the interest of the non-associate business of the Western Electric, the American Telephone & Telegraph Company did not participate in the conduct of trial installations. In writing the sentence I presume I had in mind the fact that while a large percentage of the developments undertaken for Bell System use led to trial installations, only an occasional development for the non-associate business involved what were strictly trial installations."

With regard to the matter about which Dr. Jewett was interrogated by Q. 205, record p. 329, Dr. Jewett states:

"I have read Mr. Blackwell's article and have no criticism of any part of it as of the time at which it was written.

In his outline of the fundamental possibilities and limitations of radio, and in the problems involved in the development of it as a transmission means for electrical communication, the picture as I understand it today is essentially the same as that outlined by Mr. Blackwell in 1922.

In the ten years which have elapsed since the article was written there has, however, been a vast amount of development work done by large numbers of people in all parts of the world, with the result that the field of practical use for radio is today quite different from what it was in 1922. In particular, there have been improvements and refinements in the transmitting and receiving structures which have tended to increase not only the reliability of service under any given condition but likewise the range of distances over which such service can be given and the number of non-interfering channels which can be provided in any given part of the radio spectrum. More particularly, the developments of the past ten years have tended to widen very greatly the total usable width of the radio frequency spectrum, especially in the region of the shorter wave lengths. As Mr. Blackwell points out in his explanation of fundamental characteristics, this very considerable extension of [fol. 7860] usable frequencies at the higher end of the frequency spectrum serves not only very greatly to increase the non-interfering channel possibilities but also it tends likewise to a considerable reduction in the size and cost of the terminal structures.

With the very short wave lengths which are now being experimented with there appears also to be a possibility of employing radio economically over distances which a few years ago were thought to be entirely outside the range of economic utilization.

To the extent that the radio art has progressed very substantially in the last ten year period along the lines indicated, the situation for use as it existed at the time Mr. Blackwell's article was written has been materially altered."

Stipulated that Dr. Jewett if he was recalled would testify in accordance with statements read.

Defendants' Deposition Exhibit 144, being an allocation of additional income tax payments covering periods May, 1918, to 1923, both inclusive, and produced by plaintiff at defendants' request, offered and received in evidence.

Bond circular of Illinois Bell Company produced by plaintiff at defendants' request, offered and received in evidence as Defendants' Deposition Exhibit 145.

Objection by plaintiff to Defendants' Exhibit 145 on the ground of incompetency, irrelevancy and immateriality but concedes that the paper is a true copy of the bond circular issued and distributed in connection with the sale of bonds shown thereon.

CAJETAN MORSACK, recalled.

Cross-examination.

By Mr. Blackman:

At page 435 of the record I was questioned regarding the payments that the Long Lines made to A. T. & T. and I stated at the bottom of the page and at the top of the next page that there was certain work done by the General Department, A. T. & T., for the Long Lines for which the General Treasury was compensated, and I stated that that compensation was in the shape or form of 1½% of the Long Lines' revenue. In addition to those payments, for services performed by the General Department to the Long Lines [fol. 7861] as distinct from the services which apply generally to the various companies, the General Department bills the Long Lines for such services such as blue printing, photostatic, general duplicating work and drafting. Also proportionate part of the cost of auditing by Leibrandt, Ross Brothers and Montgomery, who perform the Company audit from the standpoint of the stockholders. They audit the Long Lines' books each year.

Long Lines also pays the General Department for proportionate part of the cost of conducting the General Medical Department. Pays rental to 195 Broadway Corporation, which is a subsidiary of the General Department. If the General Department furnishes any facilities, special apparatus, it would be charged to Long Lines. I have not any particular case in mind at the present time.

As to the instances that I have just mentioned, I thought of them in this way, that when I was asked the question originally, I had in mind services which are performed by the General Department not only for the Long Lines but for the various Associated Companies and not services per-

formed specifically for the Long Lines. When I was previously asked "Is there anything in addition to that?" meaning the 1½ per cent, and I answered "Not for general services so far as I know," that answer is still correct. These are special services.

The change in the basis for computing the license revenue charged against Long Lines was made in November, 1927, involving payment made in January, 1928. The compensation to the Illinois Bell for terminal loops paid by Long Lines is the same as Illinois Bell would charge an outsider for similar facilities, for example, for telegraph and teletypewriter contract loops, that is, $3.00 per month for the first mile or fraction and 75c per month for each additional quarter mile or fraction, $3.00 a month being the minimum charge.

The charge against the customer for the special contract service in which the loop is involved is a rate per mile per year, depending on the class of service and varying with the hours of service furnished.

As to whether there is a separate charge for loops by A. T. & T., as I understand it there is a charge for the drop. It is not specifically for the loop, but the fact that there is an additional drop connected to the service—I would say our commercial man would be better qualified to talk about this particular phase than I. I cannot quote the rates.

[fol. 7862] Monthly reports, Long Lines, Nos. 1, 2 and 14, covering the month of December for each of the years 1919 to 1930, both inclusive, produced, offered and received in evidence as Defendants' Deposition Exhibits 146 to 181, to which objection is made on the ground of incompetency, irrelevancy and immateriality.

Monthly reports, Long Lines, Nos. 3, 4, 7, 11 and 18 for month of December each year—1919 to 1930, both inclusive, produced. Monthly report No. 3, Long Lines, for month of December each year 1919 to 1930, both inclusive, consisting of 12 sheets, received in evidence as Defendants' Deposition Exhibit 182.

Monthly report No. 4, Long Lines, for month of December each year 1919 to 1930, both inclusive, consisting of 12 sheets, received in evidence as Defendants' Deposition Exhibit 183.

Monthly report No. 7, Long Lines, for month of December

each year 1919 to 1930, both inclusive, consisting of 12 sheets, received in evidence as Defendants' Deposition Exhibit 184.

Monthly report No. 11, Long Lines, for month of December each year 1919 to 1930, both inclusive, consisting of 12 sheets, received in evidence as Defendants' Deposition Exhibit 185.

Monthly report No. 18, Long Lines, for month of December each year 1919 to 1930, both inclusive, consisting of 13 sheets, received in evidence as Defendants' Deposition Exhibit 186.

And to the offer of said exhibits, plaintiff objected on ground of immateriality, irrelevancy and incompetency.

Monthly Reports, Long Lines, 22A, 22B and 22C and provisional estimates relating to Long Lines, reviewed by Report 22B covering the same period, asked by defendants to be produced, refused by plaintiff.

[fol. 7863] DANIEL C. COLLINS, for defendants:

He was comptroller for E. R. P. I. and was called to testify with reference to Defendants' Exhibit 187, entitled "Condensed Summary of Results for the years 1927 to 1930, inclusive, monthly report No. 1," and after having stated that the statements on the report were correct, he also stated that the information contained on Defendants' Exhibit 189 was compiled from reports of E. R. P. I. sent to Western Electric, Defendants' Exhibit 189 being a condensed summary of summaries from said reports to Western Electric.

[fol. 7864] Inasmuch as plaintiff agreed to furnish the break-down of certain items on said exhibit satisfactory to defendants, and as such break-down has been furnished, it is unnecessary to abstract the testimony of Mr. Collins further.

CAJETAN MORSACK, recalled.

Redirect examination.

By Mr. Goldstein:

All I know about the occasion for the enlargement of the base for license payments by Long Lines Department to the General Department, effective January, 1928, is that it

came about in connection with the decrease in the rate used for licensee contract payments coincident with the transfer to the Associated Companies of the instruments. It increased the number of accounts to which the 2 per cent became applicable.

In connection with Defendants' Deposition Exhibit 142, it was stated that the difference between the gross revenue (for Long Lines) and the Long Lines' share does not represent the total payment made to the Licensee Companies by the Long Lines Department for their respective facilities used in connection with the services from which these gross revenues were derived. It was also stated that payments were made by the Long Lines Department in two ways, one by reimbursement of labor performed for the Long Lines Department by the licensee companies, and, two, by rental payments for the use of plant of the licensee companies.

There is a contract between the licensee companies and the Long Lines for the distribution of Long Lines toll message revenues. The license contract provides that the revenues will be divided pro rata according to mileage haul furnished by each company. That arrangement has been in effect since the license contract has been in effect. It has not been in effect, however, with reference to Chicago. The arrangement with respect to Chicago is more favorable to Illinois Bell with respect to the City of Chicago. The arrangement with the Illinois Bell is on the basis of reimbursing it for cost to it of furnishing all plant and facilities in the City of Chicago used in connection with Long Lines' business, plus a return of 10 per cent on the investment in the plant which the Illinois Bell furnishes, which is without [fol. 7865] deducting depreciation reserve; that is, 10 per cent of the book investment.

That arrangement has been in effect since 1911. I think the City of Chicago is the only city in the United States where this special arrangement prevails. That arrangement still prevails at Chicago.

The arrangement with respect to special contract services varies for different companies. With most of the companies' compensation for the facilities furnished by the Associated Companies in connection with special contract services is on rental basis. That does not apply in the City of Chicago, however. In Chicago, the compensation which I have described applies regardless of the use made of the facilities.

R. D. Q. 170. So that the distinction between the City of Chicago and the rest of the country is this: That in the City of Chicago the Illinois Bell is compensated by a reimbursement of the expenses of operating the Long Lines plant——

Mr. Blackman: No, not operating the Long Lines plant.

The Witness: I have not talked of operating. I have talked of facilities.

R. D. Q. 171. All right; is reimbursed for depreciation and maintenance of the Long Lines plant?

Mr. Blackman: Wait a minute. He didn't say anything about Long Lines plant. He is talking about the Illinois Bell plant.

Mr. Goldstein: You see, the Illinois Bell owns the title to all the plant in Chicago.

Mr. Blackman: Certainly.

Mr. Goldstein: And it is designated as the Long Lines plant, that is, because that portion of the Illinois plant is used exclusively in the Long Lines business.

Mr. Adcock: You mean the Illinois Bell Long Lines plant?

Mr. Goldstein: Yes.

R. D. Q. 172. That is correct, isn't it?

A. That is correct, except that some of it is not used exclusively in so far as the toll message is concerned.

R. D. Q. 173. Where it is not used exclusively, you apportion it?

A. That is right.

So that as to that portion of the plant of the Illinois Bell Telephone Company in the City of Chicago, which is used exclusively for the long distance business of the American [fol. 7866] Telephone & Telegraph Company, or that portion of jointly used toll plant which you apportion to the Long Distance business of the American Telephone and Telegraph Company, the Illinois Bell is reimbursed, or is paid, an amount which covers the depreciation and maintenance of the plant plus a return of 10 per cent on its book cost without deducting the depreciation reserve, plus administration, taxes and all of its charges in connection with that plant. The situation today is the same as it was before. With regard to special contract service revenues there are no additional payments out of those revenues to the Illinois Bell. They get their costs plus 10 per cent. We are speaking entirely of facilities. The old arrangement still

prevails as to reimbursements for the employees' labor and commissions, just as it existed before. There has been no change in principle in the City of Chicago since 1925, as far as the long distance service is concerned. There has been a change in respect to paying commissions on special contract services.

The commission arrangement which I stated went into effect on July 1, 1930, applies to the City of Chicago as well as other cities, so far as special contract services are concerned.

Our special contracts are usually designated as services, that is, a subscriber may have a given service number, a contract calling for a wire between New York and Milwaukee, let us say, with patrons connected at Philadelphia, Pittsburgh and Chicago, so there may be two or three in Chicago on that same wire. If it is a two-way service, that is, providing for communication in both directions rather than in only one direction, then on a contract the monthly charge against the customer is between $2,000 and $4,000 per month; on a full talking or short period talking contract the Illinois Bell would receive as commission for each station in the City of Chicago or at any other point in its territory connected with that wire, $16.00 commission from Long Lines. That would come out of the $2,000. I don't know how the $16.00 commission was arrived at. $16.00 is in addition to $3.00 a month mentioned. I don't know how long the $3.00 minimum charge for loops has been in existence. I should say at least ten years.

The rental basis is arrived at I think as follows: For a particular associated company's territory, we take all the contracts in effect at a given time and make a study of the [fol. 7867] revenue of the total mileage involved, thus deriving an average revenue per mile. From that we deduct the costs of operation, including commissions, which are paid to the Associated Companies for work which they do in connection with these contracts, and it is then brought down, that is, deducted from the gross revenue, so that it might be called a sort of net, although it is not a final net, and that figure is used.

Referring to Defendants' Exhibit 142, portion allocated to Chicago is not on the basis of revenue but is on the basis of the facilities and service. I do not see how it is possible to determine what portion of Long Lines' gross revenue comes from the City of Chicago so far as special contract servi

is concerned. It is not possible to show how much toll revenue originated from stations located in Chicago because there is no originating or terminating point there. We do know that in the large cities we have more subscribers for special contract services than in the smaller cities, but we never have made any special study for comparison. I don't think it can be done.

HARRY H. CARTER, resumed.

Redirect examination.

By Mr. Goldstein:

Long Lines Department makes sales of service for the Illinois Bell and the Long Lines does not participate in any of the revenue of the sales. Prior to last year there were no records kept as to the magnitude of such sales; from 1931, because of new interest in sales generally, there are certain reports that have been made in Chicago which have attempted to allocate the selling between the two organizations, that is, Long Lines and Illinois Bell. In the last year such reports show $5,100 worth sold for us by Illinois Bell and we sold for them about the same amount.

There are other records of miscellaneous items of exchange services sold by Long Lines, and the Illinois Bell is going to summarize those results, but either way it would be a comparatively small amount. For example, A. T. & T. makes a contract for special contract services going outside of Chicago and in connection with that service loops are used, which loops are furnished by Illinois Bell. We include in the charge to the customer the amount of money that we [fol. 7868] paid to the Associated Companies for loop facilities. The amount of money which the Illinois Bell charges us for the loop is included with the charge for the rest of the service that we bill the customer. It is not shown as a separate item.

(For deposition of Edwin F. Carter, see Abst. Vol. III, pp. 821-833.)

PUTNAM W. SAXTON, recalled.

Redirect examination.

By Mr. Adcock:

Provisional estimates that come from the Associated Companies are sent to the president of A. T. & T. They

are photostated by Mr. Behan's division. I don't know to whom they are distributed. Mr. Behan distributes the provisional estimates.

CR-13 for December of each year, requested by defendants, refused by plaintiff. Plaintiff also refused defendants' reque for Quarterly Report 7-A as to the Bell System, Long Lines and Illinois Bell.

CAJETAN MORSACH, recalled.

Recross-examination.

By Mr. Blackman:

With reference to redirect questions 196 and 197, I understood the questions to apply to facilities used in connection with Long Lines service other than those in the City of Chicago. With respect to the City of Chicago, the Illinois Bell receives for the facilities and services furnished by it in connection with Long Lines business, a share of the revenue from that business equal to amounts as follows:

First, on message business for each message and report charge originating in the City of Chicago, Illinois Bell receives a commission of 12c; also for each paid message and report charge, it receives an additional amount of 5c for use of trunks and recording services and facilities; for the use of central office and outside facilities, it receives the cost to it of furnishing such facilities, plus a re- [fol. 7869] turn of 10 per cent on the book investment; for operating services furnished in connection with this business, it receives the cost to it plus 10 per cent; on 2-way special contact services, it receives commissions in accordance with schedules heretofore mentioned, this commission having been effective July 1, 1930.

Any amount which Illinois Bell must pay to the American Company as licensee revenue with respect to the share of revenue it receives for these various services and facilities, is considered as a cost to the Illinois Bell and is allowed to Illinois Bell by the Long Lines.

. . . . . .

[fol. 7870]

Oral Evidence in Toll Rate Case A. U. R. P. No. 124

[fol. 7871] BEFORE PUBLIC UTILITIES COMMISSION OF OHIO

Advanced Utility Rate Proceeding No. 124

In the Matter of the Proposed Increased Rates and Charges of THE OHIO BELL TELEPHONE COMPANY for Telephone Service Between Points in the State of Ohio, Filed on December 21st, 1923, to Become Effective January 21st, 1924

Statement of Evidence

Proceedings before Honorable Charles C. Marshall, Chairman, Geo. T. Poor and Frank B. Maullar, Public Utilities Commissioners, commencing Thursday, February 7th, 1924

APPEARANCES

Messrs. S. H. Tolles, Karl E. Burr and C. S. Maltby, on behalf of The Ohio Bell Telephone Company.

Mr. F. N. Dotson, City Solicitor, on Behalf of The City of Toledo, Ohio.

Mr. John M. Lewis, on Behalf of the State Citizens Association of Ohio.

Mr. U. G. Danman, on Behalf of The Toledo Wholesale Coal Trade Association.

* * * * * * *

[fol. 7872] And also FREDERICK LELAND RHODES, called as a witness, on behalf of the Ohio Bell Telephone Company, being duly sworn, testified as follows:

Examined by Mr. Burr:

Q. Will you state your name, your residence and occupation?

A. Frederick Leland Rhodes; 53; I live in Short Hills, New Jersey, about twenty miles from New York City. My office is in New York City, and I am Outside Plant Development Engineer for the American Telephone & Telegraph Company.

Mr. Burr: For the sake of brevity, the American Telephone and Telegraph Company will be hereafter referred

to as the American Company, if there is no objection, and the Ohio Bell Telephone Company as the Ohio Bell Company.

Q. With what understanding, I will ask you, Mr. Rhodes, how long you have been connected with the American Company?

A. 32 years next June.

Q. What engineering training and experience, if any, have you had?

A. I graduated from the Massachusetts Institute of Technology in 1892, receiving the degree of Bachelor of Science in Electrical Engineering.

I immediately after graduation entered the employ of the American Bell Telephone Company. I was continuously with that company up to the year 1900, when the American Telephone & Telegraph Company took over the work that had been previously performed by the American [fol. 7873] Bell Company, and since that time I have been in the employ of that company. My early work for a number of years was assisting more experienced men in the business, really learning something about my job. After the beginning I was frequently detailed to assist associated companies in the field. Therefore, I had an opportunity to become familiar with telephone plants and telephone construction in many parts of the United States. My work has covered various parts of the telephone plant, underground systems, underground and aerial cables, pole lines and their accessories, wires, and to a considerably less extent, buildings, central office equipment and sub-station equipment.

In 1905 I was placed in charge of a section of the engineering department of the general staff, having charge of the development and standardization of construction materials, methods, apparatus and practices used in the outside plant of the telephone system.

In 1909 I was appointed outside plant engineer, reporting to the Chief Engineer, and continued responsible for work of the character I have just described. That has covered the preparation of many hundreds of specifications, covering in full detail all of the requirements necessary to secure the best results in the outside plant, and it has covered a large amount of research work, laboratory experiments, field trials and tests of a physical, chemical

and structural nature of the materials used in the outside plant. To some extent it has covered maintenance and [fol. 7874] standards, and it has included important improvements and economies in the design and use of telephone cables. It has covered work on the most economical bases of designing the outside plant, to some extent the relation of the telephone wires to high tension light and power wires, in order to keep the telephone lines quiet and safe. And it has comprehended a constant examination of new ideas from every available source pertaining to my end of the work.

In 1919, for purposes of more effective administration, there was a separation made of the then engineering department into two departments, separating the development and research work from the strictly engineering work. The two departments are known as the Department of Development and Research and the Department of Operation and Engineering. And I became Outside Plant Development Engineer in the Department of Development and Research, reporting to Vice President General John J. Carty.

Q. You are now so engaged?

A. Yes, sir.

Q. You referred in your answer to the associated companies. In brief, what are the associated companies? I do not mean necessarily their names, but what do you mean by the characterization "Associated companies?"

A. They are the companies, like the Ohio Bell Company, which are concerned in giving telephone service in the sections of the United States where they operate. The entire United States is covered by about 25 associated companies, each one of which operates within its territory. [fol. 7875] Q. With what engineering societies or committees are you now or have you been associated?

A. I am a fellow of the American Institute of Engineers. The Institute has three grades of membership, associates, members and fellows. There are about possibly six hundred fellows out of a total membership of about 15,000.

I served for five years on the Board of Examiners of the American Institute, for two years as Chairman of the Board. For one year I was Chairman of the telegraphy and telephony committee, and I — now a member of the Standards Committee, and also of the Executive Committee of the Standards Committee.

Since 1913 I have been a member of the American Electrolysis Committee.

Q. Of the Institute?

—. No, that is a committee of a number of National Organizations, such as the National Electric Light Association and the American Railway Association and the American Electrical Railway Association, the American Water Works Association, and a number of other interests, which are either concerned with underground structures which are likely to be damages by electrolysis or which operate systems which produce electrolysis. The aim of the committee is to determine the best methods for minimizing and mitigating the effect of electrolysis.

I am also a member of the American Engineers Standards Committee, and of the Executive Committee of that Committee.

In the past year I have served on the Committee of [fol. 7876] the Railway Telegraph Superintendents' Association, dealing with the matter of standardization of construction for wire crossings over railroad rights of way.

And I have been a member of the National Joint Committee on overhead and underground line construction, and on a committee co-operating with the National Bureau of Standards in formulating the National Electric Safety Code. And some others.

Q. What papers or articles, if any, have you written on telephone subjects?

A. In co-operation with another member of our Company, I prepared an article on the telephone, quite a lengthy article, for the 1920 edition of the Encyclopedia Americana. I have also personally written the article on Telephony in Nelson's Loose Leaf Encyclopedia, which is another American Encyclopedia. And I prepared an article on Telephone Development in America for the Past Ten Years for the supplementary volumes to the Eleventh Edition of the Encyclopedia Brita-nica. And then I have also written technical articles on telephone subjects for the American Institute of Electrical Engineers and a number of Articles in purely telephone publications.

Q. I believe you are a member of the General Staff of the American Company. Will you tell the Commission, if you please just what is meant by the term, "General Staff?"

A. We apply that term in the Bell System to the large con-

tral organization of experts on all phases and angles of the telephone business, which is maintained by the American [fol. 7877] Company for the purpose of developing the art of telephony by means of scientific research and also rendering advisory and consulting services to the associated companies of the Bell System, in every branch of the telephone business.

Q. What was the state of the art, if you know, in the early stages of the telephone business, how was the origin of the General Staff related to it, and briefly, what was the connection between the two?

A. Well, at the very beginning of the business, immediately after the invention of the telephone by Alexander Graham Bell, Doctor Bell and his assistant, Mr. Thomas A. Watson, were the only people that knew anything about the telephone. And I think that is rather an interesting thought, that there was nobody anywhere in the world that they could turn to to teach them anything about the telephone business. There wasn't anyone else anywhere that knew anything about it. The whole art of telephony had to be developed.

In the beginning there was a laboratory where Bell and Watson worked. Mr. Watson was shortly placed in charge of that laboratory, and that was the germ, the beginning, of the technical organization which has grown into the present general staff.

The early situation was marked by the crude character of the instruments and their lack of power and their short range. In fact, in the beginning, the telephone instrument was regarded as pretty much of a toy. There were no means for signalling, no means of calling a called subscriber [fol. 7878] to his telephone. There were no telephone switchboards, and there was a great lack of knowledge as to how to build telephone lines. The relatively imperfect telegraph lines of that era were the only lines that it was known how to build. As soon as people undertook to use the telephone they ran into a great many difficulties. They found difficulties from overhearing from one line to another. You could hear just about as well on a circuit adjacent to the one you were talking over as you could over the one you were supposed to be talking on. There were inductive disturbances on the line that came both from neighboring telegraph circuits and some atmospheric disturbances. The

facts of the matter were that the telephone art was almost totally inadequate at the time it was attempted to interest people with capital in different parts of the United States in the introduction of the instruments.

The method that was adopted in the early days was to grant licenses to individuals and firms throughout the United States and there were many hundreds of those licenses granted. Each licensee had the exclusive rights in his own territory. They had to operate the best way they could. They were financially weak and they were technically weak. They had the exclusive use of these instruments in their territory and with that they got the services of this General Staff and what they did was the natural thing to do. When they got into these difficulties in operat- [fol. 7879] ing, why they came back to the American Company and they said, "We have these difficulties. Now, what shall we do to overcome them? We have got our license, but we cannot operate our telephones." So the Staff undertook to help them, and they did from the beginning.

They were also confronted with other questions besides the electrical ones, the questions of accounting and administration and methods of operating, and they turned to the Staff, which was broadened from time to time to be in a position to advise them. So I think it is clear that the growth of this General Staff as a means of furnishing assistance to the associated companies has been a natural one. It was a matter of evolution, growing out of the character of the business.

And rather significant in that connection is an old letter that we have in our records that was written in 1879, June 26th, by Mr. Theodore N. Veil, who was then the General Manager of the predecessor of the American Company, the National Bell Telephone Company. It was written by him to Mr. Pope, who represented the associated company in New York. It is very brief and with your permission I will read it.

"Dear Sir:

Before putting any exchanges or starting in or even planning for a central office system, I think it would be well for you to consult thoroughly with Mr. Watson and examine minutely into our standard systems for central office communications. What we want to do in every case is to adopt [fol. 7880] the best system, and that we think we have. Then

if there is anything better we should, of course, want to adopt that. Please let me hear from you in regard to this."

Now, the spirit shown in that letter of wanting to advance the art and put in the best thing, has been characteristic of the Bell system from that time on.

I have photostats of that letter if you care to have them.

Mr. Burr: Let it be marked Rhodes' Exhibit No. 1, and we offer it in evidence. There are extra copies, although hardly enough to give to everyone in the room. Would the Commission like to have copies of the Exhibits handed to them as they are offered in evidence?

Mr. Maltby: They should be.

Chairman Marshall: We ought to have one set at least.

And thereupon the photostat copy of the letter above referred to was marked for identification and offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 1, and made a part hereof.

Q. Mr. Rhodes I have been asked whether the letter offered in evidence as Rhodes' Exhibit No. 1 is a facsimile of the original letter.

A. It is a photostat from a photograph of the original. The original letter is in the office of our President in New [fol. 7881] York.

Q. Yes.

A. Now, I spoke of the original Bell instrument, and I brought along a model of Bell's first telephone, which is a duplicate of the instrument through which speech sounds were first transmitted electrically in 1875. It consisted of a stretched piece of parchment, to which was attached a little Reed, which was connected with a magnet, on which was wound the operative coil, and that was the beginning of our telephone instruments. I have photographs of that, Mr. Burr, too.

Mr. Burr: May it be understood that photographs of the instrument just referred to by Mr. Rhodes, as well as photographs of the other telephone apparatus to be covered by his subsequent testimony may be offered in evidence and made a part of the record in lieu of the instruments themselves?

Mr. Dotson: There is no objection.

Q. Is the photograph, which for identification may be marked Rhodes' Exhibit No. 2, a photograph of the telephone instrument just described?

A. Yes, sir.

Mr. Burr: We offer Rhodes Exhibit No. 2 in evidence.

And thereupon the photograph above offered was admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 2, and made a part hereof.

[fol. 7882] Q. Mr. Rhodes, in order to cut the inquiry as short as possible, when I am inter-ogating you as to the photographs, I will leave out the words, "A true and correct representation," and merely ask you if the photographs are photographs of the Exhibit referred to, and it will be understood that your answer intends to mean that they are not only photographs, but true and correct representations.

A. That *Is* what I have undertaken to do,—Now, this instrument was followed by some more compact ones, the ancestors of the present telephone receivers that hang on the hooks of our sets; and in the very beginning two of those telephone receivers, one of which was used to talk into and the other to listen, alternately, with a short piece of wire connecting them, constituted the entire telephone piece at the beginning. And at that time you could put the whole telephone plant in the world in your pocket. From that beginning the great public service of today had to be created. And back of that service the telephone art had to be developed. There were no microphone transmitters, there were no call Bell devices to call the subscriber to his telephone, there were no switchboards, in fact, there were none of the thousands of parts now essential to a modern telephone system.

From the beginning the American Company undertook to develop the telephone art and to furnish information and advice to the associated companies. The furnishing of these services has required a Staff of technically skilled men, and as the art has broadened, this technical staff has [fol. 7883] grown, in response to the ever increasing complexity of the telephone business, and the furnishing of these services by this centralized staff has clearly been the best and most effective and the most economical way of making the Bell invention useful to the public. And I think it is a con-

rect statement to say that the universal service that we have in the United States and the telephonic supremacy of the United States over the rest of the world has been largely due to this arrangement. It is the duty of this staff to anticipate difficulties and to originate improvements in advance of the needs of the associated companies, so as to always have ready for their use carefully tried out apparatus and methods in advance of the time when by their growth they are confronted with the need for these things. As a result of that the associated companies, like the Ohio Bell Company, have not been required to undertake themselves broad technical development, research and standardization, because the American Company through its General Staff had done that work for them.

Now, in addition to the improvements which this staff originates itself, it is continually on the lookout for good ideas that originate itself. We have not made all of the improvements that have been made in the telephone business, and what we attempt to do is, if an improvement is made elsewhere, to acquire rights so that they will be available for the associated companies. And it makes no difference where a good idea comes from, whether it comes from [fol. 7884] the General Staff itself or from an associated company or outside the Bell system, we take it up and test it and if it is worthy, it is made available for the Ohio company and the other associated companies. All general scientific discoveries in this country and abroad are followed up and studied, and where they contain the possibility of improvement in the plant, the ideas are developed for application and made available to the associated companies.

New ideas rarely come at the beginning in completed form. They must be developed and worked into shape, and the aim of the Staff is to make available whatever there is in the art of telephony that is good for the associated companies. One phase of the work of this organization consists in bringing together ideas from all sources, good, bad and indifferent and elliminating the bad and the indifferent and making the good available for the entire system.

Q. Is the General Staff of the American Company divided into departments, and, if so, will you please give the names of the departments?

A. Yes, it is. The principal departments are the Department of Development and Research, the Department of

Operation and Engineering, the Department of Accounts and Finance, the Legal Department and the Information Department. There are other departments dealing with matters of personnel and with matters of relations with other companies. In order to make that division into departments and to show the functions of the departments more clearly, I have prepared a diagram showing these functions.

[fol. 7885] Mr. Burr: It may be marked Rhodes Exhibit No. 3, and we offer it in evidence.

And thereupon the diagram above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 3, and made a part hereof.

Q. That is the diagram you refer to?

A. Yes, the diagram I refer to I now hold in my hand.

Q. What is the total number of employees in the General Staff, if you know?

A. Yes, I do. That is, I can give you the number as of December 31, 1923, the end of last year.

Q. That will be sufficient?

A. There were then 1,824.

Q. Now, will you please describe the principal functions of those several departments, explain what it is that they do, beginning, if you please, with the Department of Development and Research? And may I ask you at this point whether, if at any point in your testimony or on exhibits there appears the letters "D" and "R", they refer to the Department of Development and Research.

A. Yes, that is right.

Q. Now, will you please describe the functions of the several departments, beginning, as I say, with that of Development and Research?

A. On this diagram I have endeavored to show, first, the two divisions of the service under the license contract, which I have divided, as appears at the top of this sheet, between [fol. 7886] the advisory, consulting, financial and general services, and what we term the instrument service. The instrument service I have shown at the extreme upper right-hand corner of the sheet. The rest of it is a presentation of the kind of work that these different departments perform. Now, under the section of this diagram devoted

services appears on the lefthand portion of the sheet a sort of an organization diagram or tree, which shows the functions of the Department of Development and Research.

This department as its name implies, conducts the development and research in connection with the new systems, apparatus or materials required in use in the plants of the associated companies. And in an art so rapidly changing as the telephone art, with such complex problems as it involves, the development and research work is a matter of great importance, and it is also of great importance that it should be organized. Our most recent important improvements cannot be credited to individual workers. There are large groups of engineers and scientists who are engaged on these problems or portions of the work assigned to each.

Q. You mean engineers and scientists who are members of the Department of Development and Research?

A. I do. I will go into that at greater length later on, describing the composition of the departments.

Q. I wanted to make sure you were not referring to outside scientists who were not members of the Staff?

A. No, I am referring to its organization, and from time [fol. 7887] to time we have found it advisable to retain outside men who are specialists in some particular subject, but this is work that is done directly in connection with furnishing these services. I made this point in regard to the organized development, and research work, because it is by that organized team work that the advances which the future holds in store will be made, and the recent advances have been made in that way. I think with what I shall say later and what is said on this chart that that makes pretty clear the general nature of the development and research work.

Now, the department shown at the right of that is the Legal Department, which furnishes the associated companies with compilations of reports and decisions, and also acts as legal specialists on all points connected with the telephone work who are available for consultation with the counsel of the associated companies.

I have shown on this Legal Department also some notes on the subject of patents. The telephone art is a relatively new art, less than 50 years old. The inventor of the telephone, Doctor Bell, died only a year ago last summer, and his immediate assistant at the beginning, Mr. Thomas A. Watson, is still living. I mention that to show the relative

newness of the art itself. Now, in that period of fifty years it has, of course, undergone rapid development, and that has meant many inventions. The telephone art is largely a patented art, and there are many patents covering the systems which the associated companies are now using. [fol. 7888] Q. Do you cover the number of patents at a later point?

A. I will, yes, or I can tell you now, if you wish.

Q. All right.

A. I might lead up to it perhaps. The American Company undertakes that rights will be acquired under all patents that are necessary to afford a field permitting the free development of the art along the lines that make for efficiency and economical service. Now, to that end the patents of the Bell system are held by the central organization and they are available for the benefit of all of the associated companies and the associated companies are charged no royalties for the use of patents. That comes under the license contract arrangement.

The associated companies do not have to concern themselves with patent matters, and a company like the Ohio Bell Company has nobody on its payroll who is looking after patent matters for it, despite the fact that they are using a large quantity of patented apparatus. The reason for that is that under the license contract the American Company guarantees the associated companies against patent litigation, and undertakes to carry it on for them whenever it arises, and the patent department of the American Company also sees that such steps as are necessary are taken, so that adequate patent protection is secured on all new developments, in order that the associated companies may have the free and unobstructed use of these things.

Q. Right at that point, Mr. Rhodes, if I may interrupt you, does the American Company by means of these patents [fol. 7889] undertake to exclude everyone else from the use of the patented article, or is the possession of the patents more intended as you say to insure the free and unobstructed use of the patented article to the associated company?

A. It is the latter, and in a number of cases other interests have sought to make use of some of these devices, and in some instances they have been granted the privilege of making use of them. The purpose of acquiring these patents is not to prevent other people from using these thing

but to maintain open for the Bell system the right to use them.

Now, there is a point right there that I would like to explain and that is, when we are undertaking a new development, we cannot tell at the beginning of the work what line that is going to take. There may be five or six different ways in which this new result is sought to be accomplished. We have to obtain patent protection, so that we can follow whichever one of these five or six channels works out in the end to be the best and the most advantageous. So we have to acquire rights that will permit us to do the thing that is it is best to do as the development progresses.

Q. Do you recall any recent case in which outside manufacturers have been permitted to manufacture an article under one of the Bell patents?

A. Well, I have in mind a couple of rather minor cases, yes. Within the last month or so?

Q. Yes.

A. We had a request in regard to a lineman's tool which we developed. It was a convenient tool for linemen to use. [fol. 7890] It was adopted for many different uses in the outside plant, and it was worked out so that it would be a particularly convenient tool. A manufacturer of tools wanted to know if he could supply those to other customers of his. Electric light companies particularly were among his customers. And we have advised him that he can do that. And there was another manufacturer who is making a type of guy rod that one of the men in my own department obtained a patent on in the course of that work.

Q. You only call attention to those as being very recent and sometimes a permissive use?

A. Yes. Now, you ask me as to the number of patents, and I have the information as of January 1st of this year, 1924.

Mr. Dotson: May I ask upon what basis that use is permitted to outside users? Upon what basis is that service allowed to outside users?

The Witness: You mean is there any royalty exacted?

Mr. Dotson: Yes.

The Witness: In those particular cases there was not. That was a case where the patent was not a particularly important thing. We patented it so that somebody else would not come along a year later and patent it himself and

then undertake to hold us up. That is the reason why we did it in that particular case.

Mr. Dotson: Your answer applies to both the guy rod and the tool?

The Witness: Yes. In the case of important patents [fol. 7891] which related to some important phase of the telephone business, those are for the exclusive use of the associated companies. As of January 1st, 1924, the American Company owned or controlled or held a license under 4,678 patents, and there were 2,742 applications pending, a total of over 7,500. Now, I have a list of those patents.

Mr. Burr: The list of patents may be marked Rhodes Exhibit No. 4, and it is offered in evidence.

And thereupon the list above reverred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 4, and made a part hereof.

The Witness: Now, the subject matter of many of these patents is of great importance in the telephone business. There are groups of them taken together, large groups of them that cover matters of vital importance in work that is under way relating to apparatus, methods and systems for still further improving the transmission of speech. There are other groups that cover ground now being traversed in switchboard improvements.

Another important phase of these patents is that they cover the systems which the associated companies are now using, in addition to the improvements which they will use in the future. That means that they assure the associated companies the unmolested use of the systems which they [fol. 7892] now have. Anyone of a large number of these patents, if it were held in hostile hands might be made the basis of a successful suit against an associated company and very expensive reconstruction to avoid infringement or else the payment of a large tribute to the hostile owner of the patent.

The important duty that this staff has in relation to patents is to be continually on the lookout for worthy ideas from any source and to that end all patents that are issued and all ideas and suggestions that are submitted to us by inventors are very carefully considered to see if they contain the germ of anything that could be developed and perfected and made useful in the telephone service. We have

examined over 5,000 patents in the last ten years. Our regular organization calls for these patents to be submitted by the patent department to our Department of Development and Research, and we study them, and if they contain anything of merit, the Patent Department seeks to acquire the necessary rights under them.

There is just one subject in that connection that might possibly be something that someone might want to inquire into and we might save a little time by anticipating it. On one or two occasions people have asked me if we do not buy up patents and suppress them. I can say most emphatically that we do not. We do not use directly the apparatus under many of the patents that we have because, I have explained, we have to be prepared to go into a number of lines of de- [fol. 7893] velopment, and when worked out, that invention does not apply. But if we suppressed inventions we would be shortsighted, and it would not be to our advantage.

A great many times while we were working to get out an operative telephone repeater, the statement was made that we were suppressing repeater inventions. We would have been feeble-minded if we had done that, because the best thing we could have in our business would have been just that. It would have been a cheaper plant for long circuits all over the United States. I do not know that it is necessary to argue that point, but I think that is one illustration of it.

Suppose that we did suppress useful patents. We cannot control the telephone business. We cannot control it in countries outside of the United States. Our patents do not hold in Europe, Japan and other countries. If we suppressed them, these people would make use of those things and their telephone systems would be better than the telephone system in the United States. And the reverse is true, because they send people from other countries here to find out how telephones are operated in the United States and go home and try to do as nearly like we do in this country as they can.

Q. Will you take up the Department of Operation and Engineering next, if you please?

A. That is the Department which is in direct consulting and advisory relation with the engineering and plant department officials of all the associated companies. Now, in

[fol. 7894] this work, I might say right here, our people do not attempt to dictate to the officials of the associated companies how they are going to do their work, but the plant superintendents and the engineers know that they have this organization, that whenever they have a difficult or complicated question or any other kind of question they can get in touch with the people in this department and get the best advice they can get out of that organization as to what to do in regard to all of their problems of operation and engineering.

Q. You refer to the plant engineers of the associated companies?

A. Yes, sir. Now, this indicates the division of the work of this operation and engineering department between *tween* the three functions of plant, traffic and commercial. There are similar divisions in the operating organizations of all of the associated companies, so that the man who is in each line of that work in the associated company has direct contact with these people who are performing that work on the staff.

Under plant there is a division of plant engineering, which I think is almost self-explanatory from the legends that are indicated on this chart. For instance, there is a Central Plant Engineering Organization that advises the associated companies of the proper uses, the proper places to use, the new developments of the system; and they advise them with regard to the modification of our standards which [fol. 7895] it is frequently wise to make in special cases. On request of the associated companies they will review the plans of the associated companies for new work, comment on them, and criticise them for them. They give technical advice: for instance, the problems involved in consolidations of plant. They give help in preparing plans for cut-overs when a new office is to be opened.

Now, under the head of plant operation there is some work shown there on operating practices and on accident prevention. We have always given attention in our work in setting up our standards to the safety of the public and of our own employees. In recent years we have been doing some additional and rather intensive work on that particular subject. This particular section has made a study of plans for reducing accidents to employees. They analyze the reports from the associated companies for every lost time accident that occurs to a plant employee, and this has

enabled them to make numerous suggestions looking to the elimination of the cause of the accidents, thereby reducing accidents to a minimum. In order to foster the interest of the employees in safety work there have been plans of action suggested to the associated companies, which included the preparation of safety codes by employees, in order to get the employees' direct interest in the work. And our people have contributed suggestions and comment in regard to that.

There have been methods set up for training, first aid [fol. 7896] teams, in the associated companies and for getting up competitions between them, to keep their interest alive.

Now, just let's see what that has amounted to. We have some statistics on the reduction in accident frequency rate among the male plant employees in the Bell operating companies. And to show that on a scale, we will take the rate of accidents, beginning in the third quarter of 1921, calling that a hundred. The rate then was not abnormally high. It was rather low to begin with. In the fourth quarter that came down on the scale of a hundred to ninety-five. For the four quarters of 1922 those figures respectively were 91, 81, 74, and 67. For the four quarters of 1923, 62, 52, 52 and 46. That is as a result of that intensive work, the accidents in the systems were cut in half.

I might also mention under that plant engineering work, there is where that has become particularly important in connection with the increasing cost of labor, and we have gone in there to the development of special machine tools in construction, automobile truck equipment, tools for cutting through pavements where underground construction is to be placed, the use of power driven pumps for pumping water out of manholes.

The traffic end of that work I won't touch, because there is another witness on that, and the commercial end is pretty fully studied. They advise the associated companies in regard to directory methods. That is a very important item in the Bell system, because in the system as a whole there [fol. 7897] is an expenditure of about $8,000,000 per year in directories, and anything that can be done to minimize in that direction is a help. Also a great deal of work has been done on adopting the right character of type for directories and the proper kind of paper to use.

Telephone sales methods are gone into carefully and also there is another portion of that department dealing with forecasting the future, which I will go into more fully later on. I might say there is one small section of that that is concerned with studies and tests of office supplies and office appliances. That does not seem so much like an important thing, but it is rather interesting. In the beginning a man from this organization visited all of the associated companies and studied their requirements very carefully. He found right at the beginning that there were 86 different varieties of lead pencils that were used in the Bell system and one standard kind would do for about 83 per cent of all the work. That saved on the whole system $15,000 a year, because in all of this work where you can unite on one thing, you have the consolidated purchasing power of the system, which enables you to buy more economically. These people made careful investigation of paper and printed forms. Instead of leaving the choice of the paper for the great variety of forms that were used in the system to the printer, the requirements of each kind of form were carefully studied, the question of how much wear and tear it would be subjected to, whether it had to be folded or not, whether there was a necessity to make erasures and changes [fol. 7898] in the form. What it resulted in was the use of a higher grade of paper for the important and permanent forms, and the cheaper grade of paper for the forms for which the use was rather transient. The transactions were estimated and the requirements bulked, so that the paper contracts could be made directly with the mills, and as a result of utilizing that purchasing power there was a saving of a quarter of a million dollars alone on that in the entire system.

Q. That is in the item of stationery alone?

A. Yes, on that portion of the stationery, the printed forms. Now, on the office appliances they have recently made a study of devices for preparing the toll service statements, the individual bills to the subscribers for their toll service, and that is rather characteristic, that little investigation of some of the work we had, and I will take just a couple of minutes to talk about it. There were various typewriters and account billing machines that were on the market for that purpose. Well, these people tested 63 machines of four distinctly different types that were submitted by six manufacturers and they compared the results on those ma-

chines with the results of posting the items by hand on the statements. They selected nearly three quarters of a million representative toll items, and they were posted under special observation to about 75,000 toll service statements. That work was all verified to determine its accuracy, and detailed stop watch tests were made as to the time taken. The advantageous features of different machines were [fol. 7899] pointed out by the different manufacturers, and arrangements were made with them to develop special equipment that incorporated the desirable features and eliminated some features that were not useful in that particular work. The result was that a special machine was developed which was availab-e to the associated companies at a quarter of the cost of the machine that was first tested that gave the greatest production. And it is estimated that the use of that machine will reduce the labor on that work in the associated companies at least twenty per cent, which will represent in the Bell system a saving of about $150,000 a year.

Mr. Dotson: Are these supplies and machines you have just described invoiced to the associated companies at the same price exactly *they* invoiced to the American Company?

The Witness: The American Company does not buy these. The associated company buys them. They buy them through their purchasing agent, which is the Western Electric Company.

Mr. Dotson: The American Company gets no——

The Witness: The American Company gets no profit on it at all.

Mr. Dotson: So that these associated companies are able to buy in quantities?

The Witness: Because they have a common purchasing agent, which is the Western Electric Company, and it purchases on a small commission to cover the cost of the purchasing work.

Mr. Dotson: Do you know what that commission is?

[fol. 7900] The Witness: It runs somewhere—it varies with different items. It runs somewhere from two per cent up to four or five.

Q. What is the reason for the variation of percentage?

A. Because there is more labor in buying some things than others. For instance, in buying copper wire the amount of work is pretty small. The work that the Western Elec-

tric Company does in that covers the warehousing also, warehousing the material in their different branch offices throughout the country.

Q. Have you referred to Exhibit No. 3 as much as you care to?

A. I think so.

Q. Let me ask you about that Exhibit and all of the others which have been or will be hereafter offered in evidence by you, I take it that you are familiar with the contents of all of them, particularly the printed statements contained in them?

A. Yes, sir. I went over this particular one carefully myself and prepared most of the statements, and then I went back and talked to the heads of these various departments to be sure I had given a fair picture of what their work was, and then the thing was laid out, drawn up by draftsmen, a zinc plate made, and they were printed.

Q. Are all of the statements in all of the Exhibits true and correct to the best of your knowledge and belief?

A. They are.

Q. I do that to avoid any other question?

A. Yes, sir.

[fol. 7901] Mr. Dotson: Just one more question with reference to the Exhibit No. 4. All of the various bracketed forms, do those represent sub-divisions in each case?

The Witness: Yes, sir. I think that will be made clear by another Exhibit which I have of both the Departments of Development and Research and the Department of Engineering, because it shows here the names of the men and the numbers of men who were working on each one of these subdivisions.

Mr. Burr: The organization diagram, showing the Department of Development and Research, may be marked Rhodes' Exhibit No. 5, and that showing the Operation and Engineering Department, Rhodes Exhibit No. 6, and we offer them in evidence.

And thereupon the paper writings above referred to were marked for the purposes of identification and offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhodes Exhibits Numbers 5 and 6, and made a part hereof.

Q. Will you tell the Commission a little more about those two departments, Mr. Rhodes, if you please, also give the

number of engineers and their training? Before answering that question however, will you please tell the Commission whether or not all of the services referred to in your Exhibits Numbers 3, 5 and 6, and the other Exhibits which [fol. 7902] will follow, are available to the Ohio Bell Telephone Company as one of the associated companies?

A. They are.

(Previous question and answer read.)

The Witness: Exhibit 5 shows the organization of the Department of Development and Research which on October 15th, 1923 had 357 employees. It shows under the Vice President in charge five sub-divisions, one at the left under the equipment development engineer, which is concerned with the Department of Apparatus, central office and sub-station apparatus. Then there is the research engineer, who is dealing with mathematical and physical research of a very high order in improvements in the transmission of speech.

The next is purely an internal executive section for the administration of the department.

Then there is the outside plant section, which is the one that I am concerned with, and there is engineering dealing with electrical interference problems, and another large section dealing with transmission development.

The Operation and Engineering Department on October 15th, 1923 had 590 employees. The top of the organization is shown on the first chart, and then the sections reporting to each one of the principal men shown there is contained in the following pages. I can bring that number of people a little further up-to-date, giving the figures as of December 31st, 1923.

The Department of Development and Research had 333 employees, and the Operation and Engineering 529. Now, [fol. 7903] I do not want to be misunderstood. Those people are not all engineers, of course. There has to be a stenographic force and various employees for the operation of a department, but in general the trained engineers in the development and research constitute a little over 60 per cent of all the employees, and in the operation and engineering it is a little less than that. We had in those two departments at the end of last year a total of 892 people.

Now, these General Staff engineers are not only highly experienced specialists covering the branches of telephone

engineering work, but nearly every one of those engineers is a graduate of one or more American Universities, Colleges of Technical Schools of recognized engineering and scientific standing. In these two departments there are 118 different American Colleges represented and eleven foreign Universities. I might say that in these two departments we have 18 men who came from colleges in the State of Ohio. I can give you the names of the colleges if you would like to know those that are represented on the staff.

Mr. Burr. Would the Commission like to have that?

Commissioner Poor: What was the statement?

Mr. Burr: Mr. Rhodes was referring to the fact that 18 of the men in these two departments were graduates of Ohio Universities, that is, Universities of this state and he said he could give the names of the Universities if anybody cared to have that.

Commissioner Poor: No, I think not.

[fol. 7904] The Witness: By concentrating the development, research and engineering work and the consulting services for the entire Bell system in this organization, we are enabled to maintain as the organization diagram shows, a force of expert specialists on every branch of the work, and by consolidating the general problems of the system, and bringing them to this organization, there is enough work to enable the staff to maintain a specialist on every technical point in the business, whose duty it is to devote all of his time to it and to know the last word in his specialty, and at all times to have this information available on call, for the benefit of one and all of the associated companies.

Now, this work requires all of the time and effort of these people who are shown on this diagram. I mention Mr. Campbell, the research engineer. We have a certain number of scientists who are constantly watching the fundamental discoveries of science, to see what may be learned, and in these days when the scientists of the world are making such fundamental discoveries, when they seem almost to be on the verge of discovering how matter is put together, we feel it is very important to keep in touch with all of those developments, so that we shall be in position to take advantage of them as promptly as may be in promoting the telephone art. Of course, that takes the time of only comparatively few men in this organization. The most of them are concerned with more direct practical problems.

Mr. Dotson: Do I understand that the full force of em-
[fol. 7905] ployees you have mentioned are devoting all their time to the work?

The Witness: Yes, sir.

Mr. Dotson: Does that vary during the year or does the office force, is the office force large- some portions of the year than others?

The Witness: No, It is a matter of rather steady increase. I think that you might be interested in that connection to know that these two departments in April, 1918 had a total force of 350 people; in July, 1919, 519; in June, 1920, 634; in January, 1921, 770; in March, 1921, 806; in December, 1921, 877. It has been a matter that, as we do one thing, opens up opportunities for improvements related to that thing.

And another fact is this, that as the business grows and comes to be very large, it is economical to take up investigations into things that when it was small were perhaps less worthy of going into, just like that matter of lead pencils. When the system gets big enough it is important. If there are only a few people it is not worth going into.

Q. Have you work for all of this number *of* constantly?
A. Yes, sir.

Mr. Dotson: Is the operating cost of these departments maintained entirely from the license revenues of the associated companies?

The Witness: I presume it is, yes. The most that I know
[fol. 7906] on that was contained in the statement that the President of the company made in the annual report for 1920, and that might be pertinent at this time. Speaking of this license contract services he said:

[fol. 7907] "The total receipts for these services in 1920 were $17,675,695.51. No separate telephone system in a city or state could perform these services for itself. Because the Bell system is a single, nation wide system, and because the services are general services in the direction of efficiency and economy, resulting in the possibility of lower rates, the apportionment of charges by a percentage upon revenue (4½%) seems to be a logical one.

Without including any provision for contingencies which may occur in the future and which should utimately be treated as part of the cost of 1920, careful estimates of the cost separately and independently made vary between $14,-

770,918.00 and $16,415,890.00. Margin between same and receipts, whatever it may be, after allowance for contingencies, contributes to the efficiency of said system by providing a broader latitude in the initiation of projects and by strengthening the financial credit of the system."

[fol. 7908] Is that the thing you want?

Mr. Dotson: Yes.

The Witness: That is the point you had in mind?

Mr. Dotson: Yes, that is the point I had in mind. Then you have no definite figures as to the actual cost of these services; you have definite figures as to the revenue of the license contract——

The Witness: Not beyond that. I want to tell you all that I know about it. I have in mind the budget for our department of Development and Research for the year 1924. It is about three and a third million dollars for that one department, which includes a sum of nearly a million and a half dollars paid by us to the Western Electric Company for development work which they do for our department.

Q. That three million dollars was the——

A. That is that one department. I do not know the budgets of the other departments. I——

Mr. Dotson: Well, the license revenue is not apportioned to various departments; the cost of the different departments is taken out of the license revenue without any apportionment whatever to that department of certain portions of the revenues.

The Witness: It is my understanding that revenues of the American Company come from several sources, from the securities which it owns in other companies, from the revenue from its Long Lines Department, the lines connecting the territories of the associated companies, and from [fol. 7909] the license contract. But as I understand, none of those dollars coming in have any particular tag put on them, that they go for one particular purpose.

Mr. Dotson: I didn't know. The reason I asked that was whether you made any apportionment of the cost of operating the various departments or subdivisions.

The Witness: We do make a budget for the year ahead, and we endeavor to hold as closely as we can to that.

Mr. Dotson: What is the character of these securities of other companies that you mentioned in this answer?

The Witness: The stocks and notes of the associated companies and the majority interest in the Western Electric Company, which is the manufacturing branch of the Bell System.

Mr. Dotson: Well, the American Company has an income also from toll revenues.

The Witness: Yes, from the Long Line.

Mr. Burr: He mentioned that.

The Witness: I mentioned that.

Mr. Dotson: Pardon me. I did not notice that.

Mr. Lewis: How much of the stock of the Ohio Bell Telephone Company is owned by the American Telephone & Telegraph Company?

The Witness: I cannot tell you exactly. I understand a very large proportion of it.

Mr. Lewis: Practically all of it?

Mr. Burr: You are talking about the common stock now.

Mr. Lewis: Yes, and it also owns a majority of the stock [fol. 7910] in the Western Electric.

The Witness: Oh, yes, I understand the ownership in the Western Electric is somewhere around 98 or 99 per cent.

Mr. Burr: My recollection is that the Ohio Bell Telephone Company has something over 3,000 stockholders.

Mr. Lewis: Those are holders of the preferred stock?

Mr. Burr: Yes.

Mr. Lewis: Would this statement be correct, that the American Telephone & Telegraph Company owns all but about $1,200 of the common stock of the Ohio Bell Telephone Company?

The Witness: I could not tell you, sir.

Mr. Lewis: You could not give any accurate figures on that?

The Witness: No.

Mr. Burr: Do you know how much revenue is derived from the stocks, from these securities that are held by the American Telephone & Telegraph Company?

The Witness: I think that is given in the annual report, but there is going to be another witness from the accounting department who is going to be much better informed on that than I am, and he would be glad to give you that information.

Mr. Burr: I can tell you this much, that it does not get anything from the common stock which it owns of the Ohio Bell Telephone Company.

Mr. Dotson: It is pretty common stock.

[fol. 7911] Mr. Maltby: Common but not very pretty.

Q. Will you describe, Mr. Rhodes, if you please some of the work which the General Staff has been doing in technical development of the telephone art, and in doing that will you please begin with the subject of cable development, for example and show what has been done? and what the results have been?

A. I would like with your permission to go back a little in that to the very early days of the business, back to the time when we did not have any cables at all, when it was necessary to run the wires on crossarms and roof fixtures over housetops, and entirely on crossarms on poles. There was no satisfactory way in the early days of the business to place the wires in cables. In 1882 the American Company conducted some experiments alongside of a railroad track in Massachusetts where some wires were grouped together in a cable and laid in the ground. They were laid by going out on this railroad early one Sunday morning and attaching a plow to a car and plowing open a trench, and then laying the cable in that trench, and then running the train along with a drag to sweep the earth back in on top of it.

Q. That trench was along the side of the railroad track proper?

A. Yes, it was right on the railroad right-of-way.

Q. But outside of the ties?

A. Just outside of the ties, yes. They had a good many troubles in doing that work. They didn't think of this plow idea until they got out there. Then they went to a farmer to get a plow and he wouldn't have it used on Sunday under any conditions whatsoever. And they had quite a [fol. 7912] time getting a plow. They went ahead with that work and it didn't come out very satisfactory. The cables leaked and they cut down transmission and generally acted very badly. However, in the following year there were plans made to lay some cables in Boston, and a conduit system was put down and some cables were placed. The next one was about a quarter of a mile long. They employed copper wires that were rubber insulated. That as of enough importance so that it was mentioned in the an-

nnal report of the American Company which came out in March, 1883. There was a little paragraph on it which I think as part of the historical background of this cable works is rather illuminating, and I would like to read it.

"In the work of putting wires underground the progress has not been as satisfactory as could have been wished. Underground cables have been laid in iron pipes in Boston in two directions from the main office, one line being 1,200 feet long and the other 1,485 feet in length. Conversation is successful within short limits over these lines, but where they are used in connection with long lines, for instance, those reaching to the suburb"—that was their idea of long lines at that time—"The voice becomes indistinct. Unless this difficulty can be removed, connection with points outside of Boston will be almost, if not quite, useless to those whose wires are underground. With our present facilities for experiments we can readily test the value of such improvements as may be offered, and we hope to get definite [fol. 7913] results before long in this direction."

After that there came experiments with different sizes of wires and different thicknesses of rubber, but the sound was muffled. It sounded as though, as one man described it at the time, it sounded as though the other man's voice was coming out of the ground, and another person described it as sounding as though he was talking in a barrel. The quality of the voice was almost unrecognizable. There was bad overhearing, cross-talk we call it, from one circuit to another in the cable, and that led to the conclusion that the best insulation for the cables, which was rubber or gutta-percha, was unsuited for telephone use. Unfortunately we cannot get hold of a piece of that very early cable, but I have got a piece of the cable which is most like it of anything at the present time. There is a cable contains eleven pairs of wires, insulated with this rubber compound, and I have pictures of that if you wish to have those in evidence.

Mr. Burr: That photograph may be marked Rhodes' Exhibit No. 7, and we offer it in evidence.

And thereupon the paper writing above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone, and is herewith submitted, marked Rhodes Exhibit No. 7, and made a part hereof.

[fol. 7914] The Witness: Now, the next development that came after that was placing fifty wires that were insulated with cotton in a pipe. They were drawn in this pipe, and then the pipe was filled with oil, trusting the oil to maintain the insulation of the wires.

Q. Was that oil known as Ozite?

A. No, that was not. This was long before the Ozite. It was in what is known as the Brooks system. They used a heavy paraffine oil. Ozite came later. Then came the use of cotton covered wire that was impregnated with paraffine, and there the wires were formed into a core and pulled into a lead pipe of quite considerable length, perhaps fifty or sixty feet of this core were pulled in. We had not got to the point of applying the lead sheath, continuously to the cable.

Then the General Staff engineers, working with the Western Electric Company, developed the use of dry cotton, instead of putting in paraffine, and it was found that cotton which was baked dry, all of the moisture driven out of it, and then promptly sealed in a lead pipe, was much better insulating material, and those wires talked. They exercised less of that distorting effect on the telephone conversation, due to the fact that they had what is technically known as lower electrostatic capacity between the wires. Finally, in about 1888 or '9 as the result of experiments conducted with dry paper, it was found that dry paper was the best insulating material that could be used for telephone wires and gave the lowest electrostatic [fol. 7915] capacity.

Q. Who performed those experiments?

A. The particular individual that performed those was Mr. John A. Barrett.

Q. What I had reference to was whether or not——

A. He was working in the plant of the New York and New Jersey Company in Long Island in connection with the engineers of the General Staff, and the work was done there because it was convenient to a man who had a lead press for extruding the lead sheath on the cable.

Q. It was part of the work of the Department of Development and Research?

A. It was very carefully carried through by that department.

Mr. McConnaughey: Was he a part of that organization?

The Witness: Why he was and was not. He was detached at that time for service with the New York and New Jersey Company. He was probably on their payroll at that time. But it was for cable work that was followed by the General Staff and was going to be applied in the plant of that company. It was a rather interesting thing that the use of this dry paper was discovered more or less accidentally. Cable cores, with the paper cover wrapped around the wires, were manufactured at the plant in Connecticut, and then they were run through a tank of sealing compound and then covered with the lead. They were getting some of those cables out in a great hurry, and they run it through very rapidly and found that it had particularly favorable electrical qualities, better than anything that had ever been made before. So they immedi- [fol. 7916] ately dissected it and found out that it had been run through so quickly that this sealing compound had only gotten on to the outside, and the inside was clear paper. And it was that idea, followed through, that led to the present pipe of cable.

Back at that time they could only put 50 pairs of No. 18 gauge wire in a full sized sheath. That type of cable has gone through a long series of tests and a continuous train of development extending over a period of thirty years.

Q. Tests by what department?

A. By the Department of the General Staff. It has involved a study of the materials and the methods of construction, such as the transmission efficiency, and where best to use different types of cable most economically in the plant. I will just briefly run through what that development has been. In 1891 the use of No. 19 gauge wires was settled upon, and in 1892 it was possible to put a hundred pairs in a sheath.

Q. How had that been brought about? By experimentation?

A. By experimentation, yes. Then in 1895 we got 120 pairs, and later in that year 150 pairs of 19. In 1896 we got 180 pairs, and somewhere between 1896 and 1898 we got 200 pairs, all of 19.

Q. Was that the result of continuous experimentation and working on the idea?

A. It was. I was engaged myself in some of that work when I first came with the company. I went around the country myself and made a lot of electrical measurements [fol. 7917] in different cities. The nearest I came here was Cincinnati in 1895, where I made some tests. Then in 1900 we started on the use of what we call fine wire cable, 22 gauge, wires weighing about half as much per unit of length as the 19 gauge did. That and the following year we made three and four hundred pair- cable with 22 gauge conductors. Then in that same year we raised the 19 gauge cable from 200 to 300 pairs.

Q. Was the installation at this time a single paper wrap?

A. Some of it was single and some of it was double. The single was a process from the double. There was a great deal of work in getting the right method of applying the paper to the wires so as to get as much air into the cord as possible; air was the best material possible, but you could not keep the wires apart with air. You had to have something else. In 1902 we got 600 pairs and in 1912 900 pairs.

Q. How did you bring about that reduction?

A. It was largely brought about in two years by improving the method of applying the paper by the use of narrower paper than was ever used before. And another proposition was that that raised the capacity, and with the same type of instruments that had been used before—by "Instruments" I mean the transmitters and receivers—that would have had the effect of reducing transmission, but the improvements that were made in transmitters and receivers have enabled the associated companies to use a cheaper type of cable than they could have. It is a combination of the two causes.

[fol. 7918] Q. How was that worked out? A. That was worked out by the engineering department of the General Staff.

Q. Yes. A. In 1912 we obtained 900 pairs of 22 gauge cable and in 1914 we obtained 1200 pairs in a 24 gauge cable. In about 1918 we made a further improvement in the 19 gauge cable coming up from 300 pairs to 450. I will speak about that a little later.

Now, I have a diagram that shows the cross-sections,

actual size, of the principal or most important of these steps that I have been talking about in cable development.

Mr. Burr. It may be marked Rhodes' Exhibit 9 and is offered in evidence.

And thereupon the photograph above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes Exhibit No. 8, and made a part hereof.

The Witness: Now, in connection with that Exhibit, which shows the physical accomplishment, the greater number of wires, I would like, right along with that, to show a diagram as to what that has meant in the cost of the plant.

Mr. Burr: It may be marked Rhodes' Exhibit 9 and is offered in evidence.

And thereupon the diagram above referred to was [fol. 7919] marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company and is herewith submitted, marked Rhodes' Exhibit No. 9, and made a part hereof.

The Witness: And I would like to talk a little bit about that if I may, Now, in making this diagram, this shows the cost of a mile of circuit in what we call a full size cable, which is about 2⅝ inches in diameter outside. I have shown along the bottom of this diagram the years from 1888 up to 1922, and vertically along the side of it is a scale showing the first cost of a mile of pair in these cables, installed, including the ducts. Now, in order to eliminate the effect of changing costs of material and changing costs of labor, these cable costs have all been computed on the basis of the material and labor costs, have been figures on the same labor rates and the same cost of materials through that period. Now, that shows back in 1888, away up at the top of that sheet at the lefthand, when we were able to put fifty pairs of 18 gauge, that mile of circuit cost over $150.00. Now, the line you see coming down shows the way the mile cost of each circuit of this cable was reduced, and down here you have the figure of $30.00 per mile of pair. The next line beginning in 1901 shows the cost of Number 22 gauge cable,

and the lowest line of all, beginning in 1914 shows the cost of a mile of pair in this Number 24 gauge cable, which means that in that type of cable we are getting a mile of [fol. 7920] circuit for not over $15.00, a little less than $15.00, which is only one tenth of what a mile of circuit in cable cost back in 1888.

Q. With the great difference in the number of wires contained also? A. Yes, but that is taken care of in this cost, because the duct savings are included in this.

Q. I was not thinking the cost end of it, but the utility end of it. A. The fact of the occupancy of the streets, for instance, or the number of cables that are put on a pole line, that is a factor in it. Now, at first sight in looking at this diagram it might appear as though we had pretty nearly reached the end of this cable development; that is, back in the nineties each successive development made a great big drop in the cost, and that drop from the successive developments has been growing less, but that does not mean that the total number of dollars that has been saved by each of these later improvements has been less than the savings that were made back in the nineties. On the contrary, each one of these later steps in the development has made a bigger saving in the system; it has saved more dollars than were saved by those other improvements. Now, the reason of that is that there is so much more cable added to the plant now than was the case 25 or 30 years ago. For example, in 1892 there were 20,000 miles of wire underground added in the Bell system, and that was a pretty considerable amount, but thirty years later, in 1922, there were two million miles of work added; that is a hundred times as much as was [fol. 7921] added underground in the Bell system in 1922 as in 1892. Now, the much larger savings of recent years are due to the fact that these relatively small amounts multiplied a hundred times will exceed the savings made back in those early days of the business.

Q. I understood you to say that in the comparison shown in Exhibit No. 9 material and labor costs are figured on the same basis throughout the period of years shown in the diagram?

A. That is right.

Mr. McConnaughey: Those costs as shown there are the costs of a single pair.

The Witness: Yes, one pair in a cable. Of course, what that means if you double the number of pairs, why, your lead sheath does not cost anymore and your duct does not cost anymore and consequently those items are being divided by twice as big a figure, because it comes down all the time. Now, I have a sample of this 1200 pair cable that I was talking about there.

Mr. Burr: The photograph of it may be marked Rhodes' Exhibit No. 10 and is offered in evidence.

And thereupon the photograph above referred to was marked for the purposes of identification and was offered and admitted in evidence in behalf of the Ohio Bell Telephone Company, and is herewith submitted marked Rhodes' Exhibit No. 10, and made a part hereof.

[fol. 7922] The Witness: This cable is made up of wires twisted in pairs, and each one of those pairs of wires constitutes a telephone circuit. Now, in the structure of the cable it is made up in layers that are spiral, one layer in one direction and one in another, and it has been cut down at this end in order to show those layers, and the dark color is simply because it has been shellac-ed so that it won't fray out at this end.

Q. When you say "At this end" you mean the end that is fanned out?

A. Yes, at the end that shows on the end of the diagram as tapered. At the other end it has been fanned out merely to give an idea of the considerable number of wires that it contains. The amount of wire in that cable can be shown in another way, by taking a section of that cable, just about an inch long, and pushing the wires out, in order to show what they amount to. Just push the wires. The wires are colored, or, rather, the paper surrounding the wires is colored, for purposes of designation. In the first place it is desirable in each twisted pair to have one wire distinguished from its mate, on order that they may be properly connected together. Then you will find other color combinations which are introduced for this purpose. It is necessary in splicing a branch cable to a main cable, to have it spliced to a particular number of pairs. That means that if the wires were all similarly colored, a splicer, in order to identify these pairs by position, would have to go through that 1200 pairs of wires to pick out for example the particular end that he

[fol. 7923] desired to obtain. Now, by making each group of a hundred pairs a different colored combination, he knows that the hundred that he wants are of that particular color and he can pick out any desired pair, simply by testing through a hundred instead of testing through 1200. It is really an economy in splicing.

Q. Who worked out that phase?

A. That was done by the General Staff in the very early days of the business. Now, in connection with the paper which is used for insulating these wires in the cable——

Mr. Burr: We have a photograph showing a section of the 1200 pair cable and it may be marked Rhodes Exhibit No. 11 and is offered in evidence.

And thereupon the photograph above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes Exhibit Number 11, and made a part hereof.

Mr. Maltby: It is reduced in size.

The Witness: That is reduced in size, yes. I might say at this point, Mr. Burr, in partial answer to your last question that the Department of Development and Research prepares the specifications under which these cables are manufactured, and I have here four typical specifications covering the detailed requirements for the manufacture of [fol. 7924] the cables and the tests that they are required to fulfil-.

Mr. Burr: Let specification No. 4123 be marked Rhodes' Exhibit No. 12; specification No. 4124, Rhodes' Exhibit No. 13; specification No. 4125, Rhodes Exhibit No. 14; and specification No. 4130, Rhodes' Exhibit No. 15.

And thereupon the specifications above referred to were marked for the purposes of identification and were offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhodes Exhibits Numbers 12, 13, 14 and 15, and made a part hereof.

The Witness: Now, there has been some very interesting work in connection with the paper which is used for insulating these wires. At the beginning of the World War we were confronted with a very serious situation of continuing

the supply of paper that is used in insulating these wires in the cables. For a great many years that paper had been made from old Manila rope stock. The new Manile fiber did not make a satisfactory fiber.

Q. How did you find that out?

A. By trying it.

Q. Who did the trying of it?

A. That was done under the direction of the General Staff. We have been seeking constantly to improve the paper and to bring down its cost. It was necessary to collect this old rope from the Maritime cities of the world largely in Europe. And at the time of the War that supply [fol. 7925] was greatly reduced.

Q. That was the rope from which the hemp was secured for the making of the paper?

A. Yes. The new Manila, the fibers are what the paper manufacturers called harsh. They do not lend themselves to a soft pliable, yet strong paper. The necessity for strong paper largely in the manufacture. The cables have to — insulated at very high speed, and a weak paper means a constant breaking and interruption and slowing down of the process of manufacturer, and increasing the cost.

Q. So that having discovered that the old Manila rope was better adapted to your purposes, you say you had to collect it how?

A. It is collected from all over the world from seaports where old rope is discarded by vessels and new rope is bought by them. The old rope is bought by agents all over the world. It was necessary then during the War to immediately take steps to conserve the supply of paper and to start at once a series of tests to see what we could do in the way of diluting this Manila paper with substitutes. We at once on the staff obtained the services of a consulting paper expert, and with his assistance and with our conferences we determined what to do.

The first thing we did was this. There is a paper wrapping that is applied around the core of the cable, between the core and the sheath. That paper did not affect the electrical behavior of the pairs in the cable. So we introduced a very considerable amount of wood fiber, wood paper, wood [fol. 7926] pulp paper in that wrapping. Then the best alternative material was cotton, and we had made cables containing paper with different amounts of cotton, and we

placed those immediately in the plant, and we also subjected them to accelerated tests, so that we could determine the behavior of that material. The result was that we were able to dilute the paper partially with cotton and obtain a very satisfactory kind of paper.

You see the difficulty is this, that if that insulating material contained any chemical that would later in the life of the cable produce internal decay, if the paper would rot or disintegrate, why the whole system would be faced with a tremendous calamity, if the cable should break down, and it meant that a very careful study had to be — by physicists and chemists, and a great deal of care taken. We had to determine the tendency of the paper to deteriorate under the influence of heat, because some of the cables in the conduits alongside of heating pipes, underground heating pipes, would be affected; and we had to determine the effect of the paraffine that is used in the splices at joints; and we had to determine the electrical qualities, of course, of the paper, and its ability to stand bending and twisting, which it gets while the cable is reeled and when it is installed.

Q. Were those studies made in your department?

A. Yes, sir, in the particular department that I am responsible for. Now, another interesting proposition comes up in regard to the sheath of that cable. It was early in the [fol. 7927] development of the business found out that lead alone was not the best material for cable sheaths. It did not have the proper mechanical strength. It was weak. It would not stand the installation, and, what — still worse, when it was used for aerial cable, it was subjected to a constant vibration, and it tended to crystallize and crack. The early cables made use of an alloy of 97 per cent of lead and three per cent of tin, which was much stronger and much more able to resist vibration than pure lead. Well, back in 1908 or so, we had been confronted with the gradually increasing price of tin, so that if only three per cent was used in cable sheaths, the cost of it amounted to quite a considerable element in the cost of the cable. And we sought to find a new alloy that would be equally as satisfactory as the three per cent of tin and would reduce the cost of the cable to the associated companies.

Well, we made experiments and field trials that extended over a period of four or five years, and we started in studying a wide range of alloys. We studied alloys of lead and tin in other proportions than the 97 and three per cent we

had been using, and alloys of lead and bismuth, and what are called — of three metals, lead, tin and copper, lead, tin and antimony. There was a range of some fifteen or twenty different elements and in different proportions of these elements.

We tested those first in the laboratory to determine their tensile strength, and their ability to withstand bending. [fol. 7928] And we constructed a special vibrating machine, whereby they were vibrated very rapidly and an account taken of the number of vibrations they would stand before they broke. And then they were tested also for their ability to withstand chemical corrosion. We tested them with a good many chemical agents, and we also got soils and liquids collected from the manholes and submerged the test pieces in those and determined the effect of corrosion. Then we took the most likely of these alloys as shown by the laboratory tests, and we made sheaths of those on full sized cables, and then we pulled those in and out of underground ducts, pulled them in and out eight or ten times, more severe service than they would ever get in actual practice, to determine whether they would hold up. And all those tests were continued, in comparison with the old style, three per cent tin sheath as a criterion of their behavior.

Q. Have you any idea how many people were engaged in that work and how much time was consumed in it?

A. No, except we were living with it four or five years, and there are at least three or four people from my department who were mixed up with it most of the time. And then we had the installation experiments, the pulling in and out, conducted by the associated company there in New York. And it is our practice when they do work of this kind for us that they are reimbursed for it. The expense of the Western Electric Company in connection with that was not billed to us, because they make the cable and their particular [fol. 7929] portion of the expense goes into the cost of the cable. It is a divided proposition the.

Well, some of this cable was put up on an elevated railroad structure. We picked a place where a branch line of the Elevated came into the main line, so that the structure was pretty violently shaken whenever a train went over it. And cables with the new sheath were placed alongside of cables with the old type of sheath, and there was a little electrical recording affair with air under slight pressure in the cables, so that when a crack opened, the air would be

released and a signal would be given, and we knew when the cable broke down. As a result of that we were able to recommend to the associated companies about 1912 and '13 the use of the sheath containing 99 per cent of lead and one per cent of antimony. That made a saving in the cost of the cables to the associated companies that has amou-ted from that time on up to December 31, 1921, which is the latest date I have these figures computed for, to about six million dollars to all of the associated companies.

I might say in that connection that had this 22 gauge cable not been developed and made available, and they had gone on using 19 gauge cable in 1921 in their plants, the entire plants of the associated companies would have cost nearly one hundred million dollars more than has been the cost today. The development of the 900 and 1200 pairs has made a reduction of nearly $9,000,000 in the whole system.

Mr. Dotson: The saving of six millions of dollars to the [fol. 7930] associated companies, is that reflected in the cost of producing the cable or the casement?

The Witness: That is in the lead sheath, yes. It means that those cables which they have now with one per cent antimony in them, if those cables had had three per cent of tin in them, the cost would have been $6,000,000 more than the actual cost has been to them.

Mr. Dotson: Did any savings of cost result to the benefit of the American Company? Did the American Company profit by that saving?

The Witness: A rather small portion, because the American Company has some cable in its Long Lines plant. But I should say in regard to all of these savings, it stands about like this. There is a great deal of our work, the work our Staff does, which does not benefit the Long Lines plant of the American Company directly at all, work we do on exchange construction, because the American Company does not own and operate any local exchanges. In the work that we do on toll line construction and on toll line transmission, and to the extent that the Long Lines use cable, those things are useful to it. But the entire Long Lines plant is considerably less than ten per cent of the entire Bell system plant and the benefit to the Long Lines Company is certainly no more than the relation which that Long Lines plant bears to the whole Bell system. Incidentally the Long Lines organization is quite independent, a

separate set of people entirely from these that are on [fol. 7931] these organization diagrams you see. The Long Lines has its own engineering department of 160 different people, entirely different people.

Q. Does it pay for its services?

A. Yes, it pays four and one half per cent.

Q. In the same way the associated companies do?

A. In the same way the associated companies do, yes.

Mr. McConnaughey: What are the savings figures of the 1200 pair cable?

The Witness: The 1200 and 900 pair cable, about nine million dollars. Now, quite recently, beginning about 1922, we arranged for the manufacture of cables in sizes of smaller than the 1200 pair, so that it developed a large use by the associated company of 24 gauge wires instead of 22 gauge wires in their plants and that is resulting in a saving of a million dollars per year to the associated companies in the cable which they buy, by getting 24 gauge instead of 22.

Q. Have you reached the end of the cable development yet?

A. No, we have not. We are now at work on cables with 27 gauge conductors, and I have here just one piece of a cross section of an experimental cable that we have made that has 1500 pairs of wires instead of 1200 in it, and we are hopeful of producing an 1800 pair cable at some time. Now, in that there are a good many factors to consider. There is the question of splicing such small wires, and we are conducting very careful splicing tests now to determine that. There are other methods to be worked out for applying the paper [fol. 7932] to the cable other than this taped wrapping we use now, and some very vital changes in the cable core, all of which we hope will lead to economies of the kind I mention.

Mr. Dotson: What is the cable core?

The Witness: Everything inside of the sheath.

Mr. Dotson: Inside of the sheath?

The Witness: Yes, sir. Now, a couple of years ago we decided that we could recommend to the companies that they use a little thinner sheath on some of the cables. We had previously been using on the larger cables a sheath that was one eighth of an inch thick and on the very small cables one twelfth of an inch thick, and on some of the intermediate

sizes 3/32. We had a lot of cable made up, pulled in, and handled rather violently, more severely, I think, I could say than cable is ordinarily handled in practice, these cables having sheaths on which, instead of reducing from the full size down by three steps, we put in a considerably greater number, which resulted in some of the cables having a sheath a few thousandths of an inch thinner than they were before. That work will save a couple of hundred thousand dollars a year in the associated companies' bill.

In mentioning these savings that have been made in the past I do not want to give the impression that we look upon the license contract payment in any way as a tribute or royalty for this work that has been done in the past, but I give the Commission these things because they are real examples of what this organization has produced and it is at [fol. 7933] work now on similar things, and we are confident that we are going to produce similar economies in the future from year to year to those that have been produced in the past. But these savings that have been made are an example of the proved capabilities of this organization to make these economies.

Mr. Dotson: To what extent are the associated companies obliged to retire existing cables when these improved cables are effected?

The Witness: As a rule it does not pay to take out cable that is in the plant. Under some conditions, such as along at the time of the War when copper reached a very high figure, there were instances where you could afford to take out in some cases 19 inch cable and replace it with 22. But these improvements apply to the new cables that are constantly added. The telephone system is a growing system, and they have to add all the time. Now, there are some situations where a subway containing a certain number of ducts will be crowded and if you did not have more wires you would have to build a reinforcing subway alongside of it; now, by pulling out a 400 pair cable and putting in a 1200 pair, you can there postpone expensive conduit construction generally. But in general it does not pay to take out existing cables.

Mr. Dotson: The thought I had in mind was whether there is any obligation resting upon the associated companies to [fol. 7934] accept these improvements as they are developed.

The Witness: No obligation on them to accept anything that they get under this license contract. What we do is to

tell them that here are these things we have made available and these are standard methods we have worked out carefully for doing these things; for similar processes we have saved so much; that these are the advantages of one as compared with the other. Now, the discretion of where to use those things rests in the associated companies.

Commissioner Marshall: Mr. Rhodes, the fact of the matter is that the parent company owning the subsidiary companies, they do adopt everything that is for the betterment of the associated companies, do they not? They are compelled to by virtue of the ownership and management.

The Witness: No, they are not compelled to. We have some very considerable debates sometimes within the family when the associated engineers come and they say they think this thing is best; we attempt to convince them; and if we do not, they can go ahead along their own lines. The men in all of the departments in the associated companies are men who are perfectly competent to decide what they need to do in the business, and they are not checked up. There is no compulsion about this. But if somebody operating those companies were to go ahead and do something that would be foolishly uneconomical, he would be remonstrated with, of course.

Commissioner Marshall: I apprehend he would not be competent, if he did not take advantage of the latest im-[fol. 7935] proved facilities.

The Witness: Yes.

Commissioner Marshall: I think there would be just as much incompetency in the parent company if they would let them do it.

The Witness: I think there would be if he did something that was obviously uneconomical. But we are dealing in many things with problems where the differences are pretty small and there may be a perfectly proper difference of judgment. But the point I wanted to make here was that there was no coercion in forcing the man in the field to do something which was against his judgment, particularly where the matter is a very small one.

Commissioner Marshall: So you won't misunderstand me, I went through this once a few years ago, and I was in favor of the four and a half per cent contract, believing that they got the benefit of the four and a half per cent or whatever they paid them. That is why I asked you if they were not compelled to. If you send all of these millions to develop the

telephone system, then they have the right to take advantage of it——

The Witness: That point has really never arisen in that way, and I do not think it would among reasonable people.

Commissioner Marshall: Well, that is all.

The Witness: That is, if there was a type of cable available which was just as good as some other type which cost ten per cent more, why nobody connected with the manage-
[fol. 7936] ment of the Ohio Bell Company would think of buying that cable that cost ten per cent more.

Mr. Dotson: The situation you alluded to might arise, however, in a case where the cable is improved as you have described and it may for that reason desire more than the cable that is in use, and yet the one in use is giving the service all right. Now, in that case is there any retirements that are required of the associated companies, because there is an improved cable which has been perfected and the American Company considers it especially useful and proper to be used in place of existing cables?

The Witness: Well, what happens is that when this improvement is made, they are advised of it and given the specifications for the cable and they find out what the costs are. Now, the local administration of the plant, if the costs and salvage value for the cable that is in there are such that they can pull out two cables and substitute one for it and come out ahead, they do it. It is a matter of providing the facilities. They, of course, wish to provide the cable conductors at the minimum cost. There is no word of instruction that is passed from the General Staff to these people that "You must pull out cables you have got here, and put in other cables to take their place."

Mr. Dotson: Well, in retiring cables for the purpose of installing the improved cable, how is that retired cable salvaged? Is there any way by which the American Company takes that over at a certain value?

[fol. 7937] The Witness: No.

Mr. Dotson: It must be junked?

The Witness: The point is this. If that cable has useful life, if it is in such condition that it can be reinstalled somewhere, the company will place it at some appropriate place in its territory. Bit if it has reached a condition of debility, where it is a source of trouble, they junk that and obtain the salvage cost. Does that answer the question?

Mr. Dotson: I think so.

And thereupon the further hearing of this matter was adjourned to Tuesday Morning, February 26th, 1924, at 10:00 o'clock.

[fol. 7938] Tuesday Morning, February 26th, 1924.

And also FREDERICK LELAND RHODES, resuming the stand for further direct examination, continued his testimony as follows:

Examined by Mr. Burr:

Q. At the close of yesterday's hearing, Mr. Rhodes, you had identified certain specifications prepared by the general staff and your department of the general staff particularly, covering certain kinds of cables. Will you describe briefly if you please the work of the general staff in connection with outside plant development? And I think it might be just as well to preface your answer by stating what you mean by "Outside plant development".

A. The term, "Outside plant" in the telephone business is applied to the portion of the plant between the subscribers' stations and the telephone central offices, and includes among the principal items underground conduits, underground and aerial cables and their appurtenances, pole lines and various types of wires.

By the term "Development" as applied to outside plant, we mean the continuous work that is conducted in developing the best types of materials and apparatus for the purpose, and the best methods of engineering and constructing the outside plant.

[fol. 7939] The outside plant is a particularly important portion of the telephone plant on account of the relatively large proportion of the cost of the entire system which is included in that term, "Outside plant".

In handling this subject from a design standpoint, what we seek to obtain is a plant of adequate strength and most suitably designed to insure the minimum cost during its life.

Now in studying the possibility of new improvements we not only conduct such laboratory tests as are necessary, but where useful we make full-size trials of proposed improvements, and frequently we conduct what might be termed accelerated aging tests. For example, to protect the iron and steel wires used in the outside plant, it is covered with a zinc coating known as galvanizing. There are numerous

processes for applying zinc, and when we are considering the possibility of one of these processes for example, we will in the laboratory expose specimens that are coated by the process under consideration in vessels containing water through which a current of air is blown. That is a situation which tends to increase corrosion very much. And we are able in the course of a few months to get results that are comparable with those that will be obtained after many years of exposure in the plant.

What I had in mind by "full size trials" could be illustrated by this. The design of pole lines, particularly with reference to the size of pole, of different kinds of timber [fol. 7940] which it is economical to install to carry a given load depends on the strength of the timber. Within the last year, we have been reviewing figures which are used for calculating the strength of poles, and in order to obtain that information we have — conducting breaking tests on full size poles, thirty and thirty-five and forty foot poles, some larger, of various kinds of timber in different portions of the United States. We have tested cedar poles in Minnesota, chestnut poles in Virginia, and we tested poles that came from the Carolinas and Tennessee. On the western coast, at Spokane we have conducted tests of cedar poles from that part of the count-y. This spring we are going to follow that up with some tests in the south on yellow pine poles.

Now there was a rather interesting result obtained with regard to the chestnut poles. We found that the chestnut poles are running a stronger grade of timber than we had been previously engineering upon. It seems that for the same class of duty we will be able to use smaller poles initially of that grade of timber, and the poles of that grade of timber that are in the plant will be allowed to remain a few years more. Just in the first cost of poles in the telephone system that will mean a saving of some three hundred thousand dollars a year in the first cost. It is on test work like that that the design of both our underground and overhead plant is based.

The expenditures for the overhead plant are worked out on the basis of careful engineering design, taking into [fol. 7941] account the load on the poles, due to wind and sleet on the wires, the strength of the wires as affected by temperature changes, and all other significant factors. T

result of that is that we are able to engineer the plant on a sound basis, and the conclusions from this work are reported in standard specifications which are supplied to the associated companies, and they are advised as to the most economical and effective measures to meet all of their various conditions. The expenditures are very carefully considered, and some of our specifications for various methods of work are the result literally of years of work on the part of a number of men. That results from the fact that there is almost always more than one way of doing the same thing in constructing the plant. There are usually — ways. Those are all carefully considered and their advantages and disadvantages compared, and some methods are eliminated, and finally the best ones are selected for the standards and then they are fully described and illustrated in hand books that the associated companies are able to place in the hands of their field forces for their guidance.

There are a good many of those hand books already issued and other subjects are in course of being taken up. I have brought a few of these as illustrations of the general set-up and arrangement of these specifications. Would you be interested, Mr. Burr, to have these put in as exhibits?

Mr. Burr: Yes. Number 3912——

[fol. 7942] The Witness: I haven't that here. The first one I have is 3913 for underground cable splicing.

Mr. Burr: That may be marked Rhode's Exhibit Number 16.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhode's Exhibit No. 16.

Q. Have you Number 3914.

A. Yes, sir; that covers the splicing of aerial cables.

Mr. Burr: That may be marked Rhode's Exhibit Number 17.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit No. 17.

Q. Have you Number 3915?

A. Yes, that is for block cable splicing.

Mr. Burr: That may be marked Rhode's Exhibit Number 18.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit No. 18.

Q. Have you Number 3916?

[fol. 7943] A. Yes, sir, that is house cable splicing.

Mr. Burr: Let it be marked Number 19.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 19.

The Witness: I might say the technique of splicing cables is different according as the circumstances under which the cables are used differ, and these contain detailed instructions for the splices, covering dimensions and methods, and we have found it advisable in preparing these hand books for the use of the field forces to have them rather completely illustrated, because the man who is conducting the work rather likes to refer to illustrations to guide him as far as possible, rather than to the test. The illustrations bear all the dimensions and it makes a ready means of reference.

Q. Have you handbook Number 3926?

A. These have not been identified.

Q. No, I will come to that a little later?

A. The next one I have is 3927 for guying pole lines.

Mr. Burr: It may be marked Rhode's Exhibit Number 20.

And thereupon the handbook above referred to was marked for the purposes of identification Rhode's Exhibit 20.

[fol. 7944] Q. What is the next one?

A. The next one I have is Number 3928 for open wire construction. I might say we use the term "Open wire" as applied to wires carried on insulators on pins and cross arms in distinction from wires that are enclosed in sheaths in cables. That is what the term, "open wire" means in the telephone business.

Mr. Burr: Let this be marked Rhode's Exhibit Number 21.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 21.

The Witness: The next one I have is specification 3930 for drop wiring. The drop wires are the rubber covered wires extending usually from a cable terminal on a pole to the subscriber's premises.

Mr. Burr: Mark it Rhode's Exhibit Number 22, if you please.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 22.

The Witness: The next one I have is 3933, house cable placing. That describes the best methods of installing cables in buildings.

[fol. 7945] Mr. Burr: It may be marked Rhode's Exhibit Number 23.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhode's Exhibit Number 23.

Q. Have you Number 4010?

A. Yes, that is a specification for the operation of a cable reel trailer. That is a devise for picking up a cable on a pair of wheels, so that it can be drawn to the job behind a truck. It is very carefully designed in order to enable the cable to be raised up on these reels and suitably handled during installation.

Mr. Burr: Mark that Exhibit Number 24.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 24.

Q. Have you one on first aid?

A. Yes. That is Number 4018. That I might say has been carefully prepared, acting under the advise of our medical director, who is studying methods of that kind, and it embodies the best information that we have as to rendering first aid by the gang in case of an accident on the job, and it is used in connection with the first aid kits of supplies which I referred to I think on yesterday.

Q. Does it cover more than one kind of accident?

[fol. 7946] A. Yes, it is intended to be applicable to all kinds of accidents that are liable to be encumbered on the job.

Mr. Burr: It may be marked Rhode's Exhibit Number 25.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 25.

Q. What is the next one which you have?

A. The next one I have is 4032 for underground cable placing. It covers the precautionary measures to be taken to avoid accidents, the preparations for placing the cable, method of building the cable and the methods of drawing cable into subways and laterals and handling the cable at terminal points, and for withdrawing cables.

Q. Why is it necessary or advisable to have special instructions on a question of that kind?

A. Because, as I said before, there are several ways of doing the same thing, and the aim here is to make carefully considered and the best methods in each portion of the work available to the companies. These specifications are not fixed things that are made and allowed to rest for long period, but as may be necessary amendments are issued to them when improvements can be made.

Mr. Burr: That may be marked Exhibit Number 26.

And thereupon the hand book above referred to was [fol. 7947] marked for the purposes of identification as Rhode's Exhibit Number 26.

The Witness: I have another one, 4033, on the subject of tree pruning, so that where it is necessary to trim trees to prevent interference with the telephone wires, it can be done in the best way to avoid injury to the trees. And in preparing this, we consulted a number of skilled foresters and utilized their advice in the preparation of these inspections.

Mr. Burr: It may be marked Rhode's Exhibit Number 27.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 27.

Q. What is the next one which you have?

A. Number 4039 cable terminating. This deals with the question of methods of making what are termed cable forms and general methods of so handling and preparing the cable that moisture will not enter it.

Mr. Dobson: Pardon me. May I ask a question?

Mr. Burr: Yes. Mark it Rhode's Exhibit Number 28 if you please.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Ex-
[fol. 7948] hibit Number 28.

Mr. Dotson: Exhibit relating to tree pruning——

The Witness: Yes.

Mr. Dotson: Isn't it a fact that most of the large cities in which you operate exchanges where tree pruning is necessary, the cities themselves, have forestry departments that have charge and control of pruning of trees in connection with public utility work?

The Witness: I think that is true, sir, in many of the cities, but there are also many places where it does not occur, and it is the desire to have the best methods followed in those instances.

Mr. Dotson: In cities where forestry departments are maintained, your company generally allows the tree pruning to be done under the direction and supervision of the cities forestry department in accordance with the rules and customs of that department.

The Witness: I think that is definitely so, although I am not absolutely certain as to the point, but it is the aim of the companies to follow local regulations wherever they exist.

Mr. Dotson: Then this service would not really obtain in cities where forestry departments are maintained.

The Witness: I think that might be so. I think it is true of these services broadly that they cover the entire operation of the plant. Some of them are more useful to certain companies than others. There may be a case where
[fol. 7949] this service of tree pruning would be relatively unimportant, for the reason you mention, but others of the specifications would be of great importance. And there may be some places where this would on tree pruning work be important.

Q. And it is very important when the pruning to be done is either outside a municipality or within a municipality where there is no such organization or department as the one referred to by Mr. Dotson?

A. I think that is true. I have three more of these if you care to have them introduced at the same time.

Mr. Burr: Yes, if you please?

The Witness: I have one, Number 4040, general specifications for the construction of jointly used wood pole lines carrying supply circuits and signal circuits. That covers the several methods of construction where it is possible to place certain classes of electric light and power wires and telephone wires on a common line of poles. There are some classes of power circuits that it is not wise to place on the same line of poles for safety reasons for telephone purposes, but there are other distribution circuits within certain voltage limits where that can be done and is done quite largely by the associated companies.

Mr. Burr: It may be marked Rhode's Exhibit Number 29.

And thereupon the hand book above referred to was [fol. 7950] marked for the purposes of identification Rhode's Exhibit Number 29.

The Witness: I have another one, specification 4102 on the subject of the operation of pole derricks. That is an example of something I referred to yesterday, where we are endeavoring as far as possible to economize on labor costs by the use of machine tools, and these derricks have been specially devised to go on automobile trucks and handle the cutting and moving and removing of poles. The hand book is completely illustrated, so that the apparatus itself and the method of using it is shown there.

Now I have just one more of the illustrated ones, specifications 4131, on the subject of the use of dynamite. Explosives are used in telephone construction in some instances in conduit construction, and in some cases for making the holes for the poles to set in. And these instructions were very carefully prepared and we had the advise of an expert on the use of explosives, in fact of more than one, and we feel that the best method from the standpoint of safety, both in transporting and using the explosives, is thoroughly covered.

Mr. Burr: Number 4192 may be marked for identification Rhode's Exhibit Number- 4-30, and Nu-ber 4131, Rhode's Exhibit Number 31.

And thereupon the handbooks above referred to were [fol. 7951] offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhode's Exhibits Numbers 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, and 31, and made a part hereof.

Q. Have you any other bulletins or specifications to which you can refer briefly, Mr. Rhodes?

A. I have. I have one other thought in connection with these handbooks that it might be desirable to state. The work of preparing these is done by the general staff, and initial copies are supplied to all the companies. Now they use these in their work in large quantities, and the quantities which they obtain are obtained from the usual supply sources at the cost of printing and paper. There is a real use made of these. In the last six years, the associated companies have obtained a little over a million copies of all these various kinds of hand books that are available, and they have obtained those for placing them in the hands of their field forces.

Q. Now they have not been sent to the associated companies in bulk, but the associated companies have sent in their requirements, and those requirements have been filled from time to time.

A. They obtain those from the supply house in the different parts of the country.

Q. And those requirements amount to more than a million as I understand you?

A. Of all of the hand books.

[fol. 7952] Mr. McConnaughey: What do you mean by "The usual supply houses" you speak of?

The Witness: Through the supply houses of the Western Electric Company in the company's territories.

Q. What period of time is severed by the million hand books that have been used?

A. Some——

Q. Well, it is not important?

A. Well, I would like to get it accurately. From October 1917 to December 31st, 1923. Now you asked me about information on outside plant matters in other forms, and I have a few instances. I have Bulletin Number 18 of the Department of Development and Research, dealing with

our investigations and tests covering a long period of years on the subject of butt treated poles. Butt treating is a method for impregnating butts of poles with preservatives to increase their life.

Mr. Burr: It may be marked Rhode's Exhibit Number 32.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 33.

Q. Give examples if you please of some typical specifications. We do not want all of them, but just give some typical ones?

A. I cannot give all of them, because they run into hundreds, but I have some typical specimens here, specifications Number 3231 for creosoting yellow pine cross [fol. 7953] arms.

Mr. Burr: Let it be marked Rhode's Exhibit Number 33.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit Number 33.

The Witness: I have also specifications 3254 for eastern white cedar poles.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 34.

Mr. Dotson: May I ask when this bulletin identified as Number 32 was issued?

The Witness: I think it bears its date.

Mr. Dotson: April 15th, 1921; is that the date?

The Witness: If that is the date on it, that is the date when it was issued.

Mr. Dotson: Is that the only bulletin ever issued on the treatment of the butts of poles?

The Witness: I should say not, there were more. We have been investigating the subject of the treatment of poles for a period of nearly 30 years. We set our first experimental line of creosoted yellow pine poles in the year 1897, and we have been following the subject very carefully and [fol. 7954] thoroughly since that time. In many parts of the country we have set experimental poles, I mean by that, poles treated in different manners, and we have set those

poles alternately with untreated poles, and after they have been there a sufficient length of time, so that there is decay you know in the untreated poles, periodically thereafter our engineers from the general staff at periods of three years examine the poles and make measurements of the progress of decay, so that we will obtain quantitative results indicating the benefits from the treatments. Now we have from time to time in the past advised the companies with regard to treatments and furnished them with specifications for the treating of poles. This particular bulletin reviews the experimental work over a period of fifteen or twenty years and puts the associated companies in possession of the results which have been obtained by preservative treatments.

Mr. Dotson: Then the experimental period has extended over a period of about fifteen or twenty years?

The Witness: Yes, sir, rather more than that.

Mr. Dotson: When this bulletin was issued, it was the first time you had arrived at sufficiently definite results on treatment of this character to enable you to issue a bulletin definitely setting forth the results.

The Witness: That is not quite the fact.

Mr. Burr: He did not say that.

Mr. Dotson: I am asking if that is it?

The Witness: No, that is not quite the fact. This is a [fol. 7955] more complete bulletin that we were able to issue before for the reason that we had no more facts and the progress of time has gone on and given us an opportunity to observe. For instance, to mention one specific case, in 1915 one of my assistants dealing with this subject and myself prepared a joint paper on the subject of the recent results obtained from the preservative treatment of telephone poles. You see as time goes on our data becomes more complete naturally.

Mr. Dotson: Naturally, yes.

Q. So this is not the first printed article on the subject?

A. No, sir.

Mr. Dotson: Well, your printed articles heretofore were simply comments upon experiments made and not a definite set of instructions as to the treatment of poles before setting them.

The Witness: I cannot quite agree with that either, because they have had complete instructions many years ago

as to not only how to conduct the preservative treatment, but as to the results obtained.

Mr. Dotson: Well, the experiments you made were such experiments as were being made generally over the country in other lines of business where poles were being used? For example, ties for railroads, railroad ties, have undergone exactly the same line of experimentation as to the preservation of their lives as the ones you have given your poles.

The Witness: I can agree with you in part. As far as [fol. 7956] the tie question is concerned, of course the problem of the railroads has been rather different from the problem from the telephone company. In the tie situation, there are two conditions as I understand it limiting the length of the life of the tie. One is the decay pure and simple and the other is the mechanical wear of the tie due to the impact of the rail, so that the railroads have not found it necessary or advisable to treat their ties as fully as we have the butts of telephone poles. That is, it would be inadvisable to obtain a length beyond that when the tie is taken out because of the conditions of mechanical wear. Now as to the completion of the experimentation on the poles, the United States Forest Service has joined with us in some of the tests on account of the extensive facilities we have had for trying to do some of these experiments, and I do not know of any other utility that has conducted experiments on the life of poles that would compare in any way with the completeness of the work that we have carried out.

Mr. Dotson: What kind of treatment have you adopted for the various companies, associate companies?

The Witness: We have recommended a statement with what is commonly called creosote oil. Its technical name is dead oil of coal tar, and the treatment that is carried on at the present time on the butts of the poles is what is known as open tank treatment. The poles are immersed perhaps up to a foot above the ground line in dead oil of [fol. 7957] coal tar, which is heated, and after a certain number of hours in that tank, they are transferred to a tank of cold oil, or the hot oil is run out and cold oil run in, and the effect of that is to condense the vapor in the pole, and the atmospheric pressure tends to force the oil into the pole.

Mr. Dotson: That is the same method by which they creosote ties for railroads?

The Witness: Yes, they do. I do not want to give an impression that this is a process that is patented or controlled by us in any way. Our situation was this. We were in a situation where we wanted to advise the associated companies as to the methods to employ in their work, and that is what we have undertaken to do and have done.

Mr. Dotson: You have profited of course by the experiments of others in similar lines.

The Witness: We have followed what other people have been doing, but our recommendations are based upon our own experiments.

Mr. Dotson: Your experiments and investigations.

The Witness: Yes.

Mr. Burr: Bulletin Number 2321, if not already marked for identification, may be marked 33.

Mr. Kinnisson: Does your general staff make any check to determine the degree to which this information is utilized by your associate companies?

The Witness: Nothing formal on the subject, no. Of [fol. 7958] course our men are in the field, visit the associated companies frequently, and these matters are all matters of discussion at those times, and when the engineers of the associated companies come to headquarters they are discussed, but there is no formal follow-up method. Our people in the field operating these companies are engineers of a high grade of intelligence, and when they get this information they know how to use it to their best advantage.

Mr. Kinnisson: Do you compel the adoption of suggestions sent out in your hand books?

The Witness: No, sir, it is an advisory service.

Mr. Kinnisson: Entirely.

The Witness: Yes, sir. While we are on this subject, I brought out a copy of specifications 3744, which are specifications for the analysis of dead oil of coal tar or coal tar creosote.

Mr. Burr: They may be marked Exhibit Number 35.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit Number 35.

Q. You may proceed now.

A. The next one is specification 3838 for Douglass fir cross-arms.

Mr. Burr: Mark it Rhode's Exhibit Number 36.

And thereupon the specification above referred to was [fol. 7959] marked for the purposes of identification as Rhode's Exhibit Number 36.

The Witness: 4114, specification for exchange insulators.

Mr. Burr: Rhode's Exhibit 37.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit Number 38.

Q. To interrupt you a moment, Mr. Rhodes, isn't it true that in investigating various methods to be employed or proposed to be employed and recommended to the associated companies, and in investigating the various types and classes of plant in the laboratories of your department, you go to the trouble of simulating weather conditions in various parts of the country as near as possible in order to determine the particular adaptibility of one kind of apparatus or another to a particular locality, including the State of Ohio?

A. Yes. As an example of that, we have conducted a rather exhaustive series of tests on switch board cords in a room where the atmosphere was maintained at a high humidity. The ability of German silver springs to withstand and repeated bending has been determined in rooms at a low temperature, where the metal would have the best opportunity to tend to become brittle. In fact, on this question of timber, we maintain what we call the [fol. 7960] fungus pit which is a room where the temperature and the humidity is maintained at values favorable to decay of timber, and specimens of timber, treated with various forms of preservatives, are placed there and are innoculated with a decay producing fungus in order to attempt to obtain accelerated tests on the value of preservatives. Those tests are not conclusive, but they are a very reasonable indication of the relative values of different tests of preservatives.

Mr. Dotson: You do not claim they are conclusive tests, even as to atmospheric conditions.

The Witness: No, those particular tests are not.

Mr. Dotson: And they do not demonstrate anything with reference to soil conditions or chemical conditions of the soil where poles are placed.

The Witness: To that extent, as I say, they are not complete and final, but they are a useful preliminary indication. We depend for our final recommendations in regard to this matter of treatment on actual poles installed under conditions of use and carefully followed up.

I have another specification dealing with the matter, dealing further with the matter, of the preservative treatment of poles. This is specifications Number 4122, provisional specifications for the perforation treatment of poles.

It might be interesting to know a little something about that. There are some kinds of timber, cedar particularly, that it is rather difficult to force the preservative into the timber, and therefore it has been found advisable to me- [fol. 7961] chanically perforate the butt of the poles, with the perforations extending in perhaps an inch, which allows the oil to enter the pole, and then circulate in the wood, parallel with the long axis of the pole. I would like to say in connection with that that is not a process which we control, but it was I think first suggested by a Hungarian engineer many years ago. And at that time we set an experimental line of poles that had been perforated and treated. We set those in the south in order that the results could be obtained as soon as possible, because decay proceeded more rapidly there, and the results obtained on that line were a portion of the things that we availed ourselves of in making these recommendations.

Q. What department bore the expense of this enormous amount of experimentation and what one does it now?

A. It is done now by the department of development and research. Before the departments were separated in 1919, as I told you yesterday, It was done by the engineering department, and of course we bear all of the expense of sending our engineers out around the country to make these periodical measurements on these experimental poles, and we have also to take men along to excavate around the poles, and of course we bear the expense of that also.

Q. The entire expense is borne by the American Company?

A. The expense of making all these observations yes.

Mr. Dotson: All of that expense is finally covered by the licensee revenues.

[fol. 7962] The Witness: That is a portion of the services performed unde- the license contract, yes.

Mr. Dotson: The question is, all of that expense is finally covered by this license revenue.

The Witness: As I said yesterday, I do not know that these particular dollars go for that particular purpose.

Mr. Dotson: I mean in amount; the revenue is sufficient.

The Witness: Generally that is true.

Q. It is if the license revenue payment in general is large enough to cover the total expense?

A. I think that is a very fair way of stating it.

Mr. Dotson: My question is, it does cover it? You have the records to show it.

The Witness: I don't know anything further about that except that statement I read from the 1920 annual report, which indicated that the expense ran from 14 to 16 million dollars as against a payment of 17 million.

Mr. Dotson: Outside of that knowledge of yours, of course the records would disclose whether that is the fact or not? I say outside of your personal knowledge, the records of the company, the American Company would show whether the revenues from the license contract have been sufficient to cover the total cost of these experiments.

The Witness: I don't know as to that. Of course the facts are in the records but the allocation of that expense involves a prorating on a series of assumptions.

[fol. 7963] Q. You could not determine it accurately could you?

A. I beg your pardon.

Q. It would not be possible to determine it accurately?

A. I do not see how it could be determined and I do not see how it could be prorated among the companies.

Mr. Dotson: I am speaking now with reference to the budget of expense of the general staff as a whole.

Chairman Poor: Disregarding the department subdivisions?

Mr. Dotson: Your records will show the total revenues of the general staff derived from the license contracts? That is what I am assuming.

The Witness: I cannot tell you that in detail, because I am not familiar with the accounts. As I told you yesterday I know the budget of my own department.

Mr. Dotson: My question only referred further to the total expense account of the general staff, not of the different departments as so organized.

The Witness: I cannot tell you as to that because I am not familiar with the accounts.

Mr. Kinnisson: In the absence of a check back to determine the degree to which this information is used by the ass-ciated companies, how can you approximate its value.

The Witness: Well, take the case of some specific item. I mentioned yesterday the saving from the use of lead-antimony cable sheath. That was made up from a knowl-[fol. 7964] edge over a period of years when that sheath was first put into use of the total amount of antimony which had been bought for use in cable sheaths by the manufacturer, the Western Electric Company, and knowing the total amount of anitmony that had been bought, I was able to find the amount that had gone into the sheaths.

Mr. Kinnison: I was referring more particularly to the information you introduced as Exhibits here this morning, the dissemination of those as the result of your research work.

The Witness: Yes.

Mr. Kinnison: How can you determine the value of that?

The Witness: We can determine what the savings have been from the new type of plant over—would have been the cost of the plant on the old basis.

Mr. Kinnisson: Whether they use it or not.

The Witness: We know they have utilized it.

Mr. Kinnison: Then you have checked back?

The Witness: No, not by check. I know the companies which have been using the three per cent of tin, because they made a saving of somewhere from eight to ten per cent by adopting the antimony sheath.

Mr. Kinnison: That is one particular instance. I am referring to these subjects this morning, the dissimination of information as a result of your research work.

The Witness: Yes.

[fol. 7965] Mr. Kinnison: You do not check it.

The Witness: We have no formal check-up.

Mr. Burr: Mr. Kinnison, by later witnesses we will show

the value of the services to the Ohio Bell company. That is what you are trying to get at.

Mr. Kinnison: Yes.

Mr. Burr: We will show that by other witnesses.

Mr. Laylin: May I ask a question right there, Mr. Burr?

Mr. Burr: Yes, glad to have you.

Mr. Laylin: With reference particularly to these exhibits which have been introduced this morning, I note that they are referred to as A. T. and T. specifications; is that not true?

The Witness: Yes, sir.

Mr. Laylin: Are they a compulsory specification for the benefit of the A. T. and T. employees; in other words, on your Long Lines, are they compulsory?

The Witness: No more so than in a case of an associated company. That is, the long lines is organized similar to an associated company, with its own staff of employees, and they have their own engineering department, and this information is available to them just the same way it is to the associated companies.

Mr. Laylin: But there would be no definite way of determining would there the relative degree in which this information is valuable to the A. T. and T. Long Lines as compared with the associated companies.

[fol. 7966] The Witness: Only as I said yesterday; out of the total plant of the Bell system the Long Lines plant is somewhere between five and ten per cent; I should say off hand, roughly, it is about six or seven per cent of the entire plant of the bell system. Some of the work we do is valuable to the long lines in that proportion, that is, six or seven per cent of the benefit of it would go to the Long Lines, but in much of the work we do that applies to exchange construction methods, the A. T. and T. Long Lines would make no use of that.

Mr. Burr: I think Mr. Laylin was out of the room yesterday when Mr. Rhodes stated that the Long Lines pay four and a half per cent for the services in exactly the same manner that the associated companies do.

Q. Have you any other specifications to which you wish to refer?

A. I have a half a dozen more if you wish to put them in. They are in substantially the same form as these other exhibits.

Q. I would like to have you identify a few more of them, because one or more of them from time to time seem to promote a discussion which brings out the character of the services and perhaps suggests questions to some of the gentlemen in the room, which questions we are glad to have them ask?

A. Specifications Number 4135 for copper wire.

Mr. Burr: Mark it Rhode's Exhibit Number 40.

And thereupon the specifications above referred to were [fol. 7967] marked for the purposes of identification as Rhode's Exhibit Number 40.

The Witness: Specifications Number 4144 for Type B drop wire.

Mr. Burr: Rhode's Exhibit Number 41, Mr. Walcutt.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit Number 41.

The Witness: Now, there is a case where the original rubber covered copper wire employed conductors of hard drawn copper. By utilizing a conductor of steel covered with copper, it was possibly to obtain the same tensile strength by means of a smaller wire, which was cheaper for the associated companies. This particular specification covers the drop wire in which the conductors are bronze, and under usual market conditions that proves in over the steel copper conductor in a rather interesting way for the reason that the metal in the copper-steel conductor had no salvage value practically when the wire has to be abandoned, whereas in the bronze wire the metal has a considerable salvage value, so the annual cost of the bronze under present conditions and conditions that have obtained for some time is less than the copper steel. The saving when that was put into use along in about 1921 was about [fol. 7968] $175,000.00 the year to the associated companies.

Q. What department made the investigation or discovery from which those results were obtained?

A. That was done in the department of development and research of the general staff.

Q. You may proceed?

A. Specifications Number 4180.

Mr. Burr: Rhode's Exhibit Number 42.

And thereupon the specifications above referred to was marked for the purposes of identification as Rhode's Exhibit Number 42.

The Witness: Specifications for a guy clamp that covers a guy clamp of greater holding power than the clamp that had preceded it, and it means that under some conditions in high strength strand that it is possible to hold the strand by means of two clamps where there formerly were three clamps employed. Specifications 4209 for creosoted yellow pine poles.

Mr. Burr: Let it be marked Rhode's Exhibit Number 43.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit Number 43.

[fol. 7969] The Witness: And specifications 4213.

Mr. Burr: Mark it Rhode's Exhibit Number 44.

And thereupon the specifications above referred to were marked for the purposes of identification as Rhode's Exhibit 44.

The Witness: For wooden insulator pins. Before leaving this subject of outside plant, as long as the question is taking the form of some inquiries about poles, it might be worth while *that* state that ten or a dozen years ago we made and put in service about 500 re-enforced concrete poles. Now the purpose of that experimental trial was not that we had any hope that under present price relations of materials that there was any immediate opportunity for using re-enforced concrete poles economically in the telephone plant, we did not, and the associated companies did not, know about the behavior of re-enforced concrete poles. We did not know what would be the effect of frost or lightning on the poles. These poles were made and some of them were weather-proofed by various methods. The behavior and condition of those poles *is* being followed up. Now the purpose of that work, characteristic of one phase of our work in general is this, that in the future price conditions may be such —You see the price of wooden poles is rather continuously going up—Price conditions may be such that the associated companies will wish to consider the use of re-enforced poles, [fol. 7970] and we wish to have this experiment behind us, covering a long period of years of service and observation,

so that we will be able to advise them on the basis of actual experience as to the best type of re-enforced concrete pole to use if they desire to use them.

Q. Are any of those poles in Ohio?

A. I think not. Now this work, like all of the work I have talked about, is a continuous and continuing thing, and is going on actively right now. We have for two years past been collecting experience in the plant with a still cheaper type of drop wire, in which the two rubber covered wires are enclosed under a common braid, instead of having each wire covered by the braid. That is going to save close on to $200,000.00, and it will be recommended very shortly now to the associated companies, and arrangements made to enter into the commercial production of that type of wire.

In connection with it, we have been conducting a series of experiments on some special forms of outside braid for that wire, made up of threads and lay-s of the thread, which have a considerably higher wearing power, power to resist abrasion.

The purpose of that is this. These drop wires in many parts of the country have necessarily to go through trees, and the present practice is to place a mechanical protection outside of the wire, some form of tubing that resists abrasion. There are many conditions where although this particular braid will be more expensive in the first cost than [fol. 7971] the wire without it, it will be less expensive than the wire plus this tube protection. We tested a great many types of braid to determine its ability to resist abrasion. We found on one particular series of tests that whereas the braid we used in the past would withstand about 20,000 rubs, that the best type of device in this newer and more expensive type of braid would withstand over two million, that is, a hundred times as many rubs, and was still in excellent condition after the two million. We have had some of this out in a portion of the plant where the life of the ordinary drop wire, on account of the abrasion from limbs of trees, was about four months, and after about two years, this type that I am talking about now was found to be in an excellent condition. That is just one example of pending work that is going on now.

Q. What kind of study if any do you make before at-

tempting some of the things covered by these specifications and by your testimony as having been done by your department?

A. Well, if I get what you mean, we do not enter into the work on a problem of any of these kinds just for the sake of keeping our people busy, but we do look to see where there is an opportunity for large saving to be made in the plants of the associated companies, and those are the problems that we attack.

Q. That is what I had in mind. You testified here in Ohio some three years ago on the subject of the services rendered under the license contract. Am I correct in my understanding that the work of the department has been [fol. 7972] going on since that time and that much has been accomplished as the result of the development and research work for the three year period, and that the work is still going on?

A. It certainly has and it is going on, yes.

Mr. Burr: We offer Rhode's Exhibits 32, to 44 inclusive, in evidence.

And thereupon the paper writings above offered were admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhode's Exhibits Numbers 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, and 44, and made a part hereof.

Q. Describe, if you please, the work done by the general staff in the development of methods for guarding telephone lines against the disturbances from high tension wires?

A. That has been for a great many years a very important subject of investigation, not only from the disturbances caused by high tension wires paralleling the telephone lines, but also we have a continual consideration of prevention of overhearing from one telephone circuit to another.

Now the importance of that line of work arises from the fact that the telephone is the most delicate and sensitive electrical instrument that there is. I mean by that that the voice currents which operate it are the feeblest currents used in the electrical art. Now that statement by itself may not mean very much, and in order to get an illustration of [fol. 7973] that, I asked one of our engineers to make a calculation for me, which shows the energy required to vaporize a drop of water is sufficient to make a telephone receiver give out an audible sound for at least a million years. That

gives some little measure of the sensitiveness of the instruments and the feebleness of the current we are dealing with.

I mentioned yesterday that in the early days the telephone lines were subject to what were then rather mysterious disturbances. There would be all sorts of whistling and snapping sounds on the line. That came partially from atmospheric electricity and partially from induction from neighboring telegraphic circuits. With the introduction of electric light, these disturbances were so multiplied that a remedy had to be found or the extension of the telephone service would have been impossible. The general staff has worked continuously ever since in developing methods of transposition, that, is, interchanging the position of wires at intervals along the line with respect to each other and with respect to the disturbing circuits. With each new development of electric light and power and railway circuits, our difficulties have changed and new types of troubles have appear-d and have had to be contended against.

There has also with the use of very high tension power transmission lines arisen questions of hazards to the telephone service. I might say that when the single phase alternating current electric railway method of operation was [fol. 7974] introduced, in which the electrification of the New York, New Haven and Hartford railroad was one of the principal early cases, these disturbances came up in very exaggerated form. The telephone circuits within several miles of that railroad were seriously interfered with. A very highly balanced telephone cable in a conduit laid under a highway paralleling the railroad had enough voltage introduced through space in its wires to operate an ordinary electric light. That required joint work with the railway engineers and the experts of the manufacturing companies and an arrangement was worked out whereby that trouble was very greatly minimized, so much that the operation of the telephone lines could go on.

The question came up in regard to this interference on the Pacific Coast. It came to the attention of the State Commission in California, and a committee was formed under the auspices of the State Association, on which were representatives of the Commission, of the power companies, of the telephone and telegraph companies. The associated company in that territory called on the general staff to direct the telephone part of the investigation on its behalf. We had a representative of the general staff on the Pacific Coast

for a period of five years, and another of our men made trips out there and stayed for six and nine months at a time. The general staff shared in the expense of the committee. There was other work growing out of that, and the results obtained have been to the benefit of all the associated companies.

[fol. 7975] In connection with this transmission end of our work, which is concerned with transmitting the quality of the voice as nearly unimpaired as possible, and directing the design of the plant to that end, so that the transmission will be loud and clear, the art has progressed very rapidly in comparatively recent years. It seemed advisable to offer the associated companies an opportunity of letting their transmission engineers have the last word on this subject, and arrangements were made to conduct in New York what, for lack of a better name, we called a transmission school, where the transmission engineers of the associated companies were invited to come during the year 1920 and they were given lectures and an opportunity for laboratory work. Three terms were given during the winter of 1920 and '21.

The courses were conducted by staff engineers and dealt with the elements of telephone transmission on theory, laboratory work, and courses in the practical operation of repeaters and carrier current systems; another course dealing specially with these inductive interference matters, on which a great amount of recent work has been done, was given later than this, during the winter of 1922 and 1923. That course was attended in all by 112 representatives of the associated companies and covered a period of three months. Now in both of those schools I believe there was somewhere from six to eight representatives of the Ohio Bell Company who attended them and got the benefit of that information. There are of course a great many more men connected with [fol. 7976] the Ohio Bell Company to whom it is valuable to give that information, and the purpose was that these selected men who came there and got that information were enabled to come back to the company and give courses themselves within the company, whereby that information was passed out to a large number of employees in the Ohio Bell Company.

As long as we are dealing with that subject of inductive interference, I have a typical circular whereby the latest information with regard to schemes for transpositions of wires have been given to the associated companies. This

was prepared somewhat less than a year ago and is contained in a circular letter, Number 1261, which transmits notes on transposition practices, and the pictures which are given in this of the transposition diagrams will serve to illustrate methods that are followed, not the physical methods of constructing transpositions, but the location of these transpositions, and give some idea of the complexity of the idea of the work.

Perhaps I can give a still better idea of the complexity of it by saying that the design of two kinds of transpositions sections worked out by the general staff required a total work of seven hundred man days in order to go over the various possibilities, eliminating the more complex ones, and finally arriving at the simplest form to accomplish the result. This, Mr. Burr is the exhibit of transposition practices.

[fol. 7977] Mr. Burr: That may be marked Rhode's Exhibit Number 45, which is Number 1261. We offer Exhibit Number 45 in evidence.

And thereupon the pamphlet above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhode's Exhibit Number 45, and made a part hereof.

Q. Tell briefly something of the protector work carried on by the general staff for the benefit of the associated companies.

A. It has been necessary to devise protective apparatus to be place- both at the subscribers' stations and at the central offices to protect against lightning troubles and to arrange so that — event of an electric wire becoming crossed with a telephone wire, that the circuit will be cut off at the protector so as not to injure or kill the telephone user or to set fire to his house, and in the same way to protect the central office.

Very briefly, we have followed that matter up for a great many years, experimenting and devising the best forms of protectors. Comparatively recently in 1919 or 1920 an improvement was made in the form of protector blocks used at the sub-stations, where, instead of a pair of carbon blocks, separated by a mica separator, a porcelain block was used. In plain language the effect of that was to minimize the troubles caused at the protector by lightning storms. With

the old type, after a lightning storm, a great many sub-sta-
[fol. 7978] tions would be in trouble, due to the protector having short circuited the line. This form of protector that was devised was equally efficient as a protector and it very appreciably reduced this maintenance trouble at the time of lightning storms. The protection at both the sub-station and the central office is described in a series of hand books of the same nature as the hand books that have already been introduced through me. And the first of these that I have is specifications 3881.

Mr. Burr: Mark it Rhode's Exhibit Number 46.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhode's Exhibit Number 46.

The Witness: Main frame protection for what are known as B type frames. Specification 3882, main frame protection for A type frames.

Mr. Burr: Rhode's Exhibit Number 47.

And thereupon the hand book above referred to was marked for the purposes of identification as Rhode's Exhibit Number 47.

The Witness: Specification 3918, sub-station protection.

[fol. 7979] Mr. Burr: Rhode's Exhibit Number 48.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhode's Exhibit Number 48.

The Witness: Specifications 4157, cable protection.

Mr. Burr: Rhode's Exhibit Number 49.

And thereupon the handbook above referred to was marked for the purposes of identification Rhode's Exhibit Number 49.

The Witness: Specification 4170, sub-station and branch exchange protector installation.

Mr. Burr: Let it be marked Rhode's Exhibit Number 50.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhode's Exhibit Number 50.

The Witness: Before leaving this subject of outside plant safe construction, I might say that we have another handbook, specifications 4190 on the subject of railroad crossing.

Mr. Burr: Mark it Rhode's Exhibit Number 51, if *if* you [fol. 7980] please.

And thereupon the handbook above referred to was marked for the purposes of identification Rhode's Exhibit Number 51.

The Witness: That is prepared by our department of operation and engineering and is the continuation of some work that was first started many years ago. It is desirable to take precaution where telephone lines cross railroad rights of way so as to minimize the danger of wires falling and interfering not only with men riding on freight cars, but also with the operation of the railroad signal systems. We found that almost every railroad had some requirements of its own, and a foreman going out with the gang to build a telephone line would come to a railroad and he would have to find out what the requirements at that crossing were, and then perhaps a mile further along he would come to another railroad and he would find that those requirements were different and he would have to send back for some different material to use, and so on. It was rather a complex and to some extent wasteful operation. We took steps to arrange for a joint committee meeting, first with representatives of the railway superintendents' Association. The work has since been built up through the American Railway Association, and the result is we have prepared standard specifications applicable to railroad crossings, which are generally adopted by the railroads and by the telephone companies and one method has been adopted [fol. 7981] to replace the great many that were in effect before that time.

Q. Now isn't it true that certain standards have been adopted by the Public Utilities Commission of Ohio?

A. I think very likely. I know they have by many.

Mr. Burr: I suppose counsel will take my statement for the fact that, pursuant to a recent enactment of the legislature, this Commission has adopted the most exhaustive specifications covering the matter of protection of telephone wires in conjunction with high tension wires and the matter of inductive interference and the crossing of railroads

by wires and various kindred subjects. If there is any question about it, I will give a definite reference to the statute and to the commission administrative order.

Q. You may state, Mr. Rhode's whether or not any of the men connected with the general staff and with your department worked on the matter just described here in the State of Ohio?

A. I understand that two of the representatives of the general staff came here to assist the officials of the Ohio Bell Company at the hearing and place at their disposal the special experience that they had accumulated by working on that problem for a great many years here and in other places.

Mr. Burr: We offer Exhibits 46 to 51 inclusive in evidence.

And thereupon the paper writings above offered were [fol. 7982] admitted in evidence on behalf of the Ohio Bell Telephone Company and are herewith submitted marked respectively Rhode's Exhibits Numbers 46, 47, 48, 49, 50 and 51, and made a part hereof.

Q. What does the general staff do if anything in regard to the protection of underground telephone cables against electrolysis?

A. We have always kept the associated companies advised and have furnished them consulting advise in special cases where electrolysis troubles had been experienced. The term "electrolysis", I might say, is applied to the destruction of underground metallic structures by the return current from railway traction systems. I mentioned yesterday that the general staff has had representatives serving since 1913 on the American Committee on electrolysis, where a large number of utility associations are co-operating, in seeking the best methods of mitigating electrolysis, and particularly attacking the problem at its source by reducing the amount of spray current in the earth. In that work, as in a number of lines of work, instead of the associated companies all over the country being required to send representatives to take over any committee work of that kind, the general staff is in a position to act for all of the associated companies.

And thereupon a recess was had until one thirty o'clock P. M. of same day. (Tuesday, February 26th, 1924.)

[fol. 7983] Tuesday Afternoon Session

February 26th, 1924.

And also FREDEIK LELAND RHODES, resuming the stand for further examination in chief, continued his testimony, as follows:

Examined by Mr. Burr:

Q. Mr. Rhodes, what services does the General Staff render in connection with building plans and what work does the staff do on that subject?

A. Very briefly it prepares efficient and economic building floor plans, so that the building will be designed with reference to making the building fit the equipment, rather than force the equipment to fit the building. It participates on the request of the associated companies in planning new buildings and extensions to existing buildings, and advises as to the desirable size and shape of lots of land for specific building projects, so as to give them economical arrangements of apparatus in the building. It recommends fire prevention means and plans, and also advises on fire protection apparatus, and it advises regarding the maintenance of buildings, that is, there is on the Staff a division of people who are skilled and experienced in telephone buildings. They do not deal with these buildings as an architectural proposition but as an equipment proposition.

[fol. 7984] Q. There are characteristics peculiar to the construction of telephone buildings, are there not?

A. Oh yes, there are such matters as arranging the equipment, so that it can be economically operated and maintained, the question of the air supply for the operating rooms, the question of floor strength in order adequately to hold the apparatus. The matter of future expected changes in the pipe and weights of apparatus have to be taken into account, and suiting the building to the arrangements of the cable runs between the frames and apparatus in the equipment.

Q. What has been done by the General Staff on the subject of the development of switchboards? I do not care to have you go into that in detail, but I would like to have you answer the question in a general way if you will.

A. I will answer it very briefly. Since the early days of the business the question of the types of switchboards and

the details of switchboards have been a matter that has been constantly studied. Throughout the operation of the manually operated board there have been such steps as the development of the multiple principle, whereby each subscriber's line is so placed that every operator can have access to it. Associated with that is the question of the busy test so that a subscriber will not plug in on a line which is already in use. Now, those principles, the multiple principle and the busy test principle, have survived in all forms of manually operated boards and in the so-called automatic boards as well.

[fol. 7985] One important step in the development of the manually operated board was the development of the common battery system, whereby the local batteries at each subscriber's station were done away with and the energy supplied from a storage battery at the central office. The development of that principle was worked out by the General Staff.

Then some fully fifteen years ago the question of the development of the so-called automatic switchboards was taken up. There was a form that was devised outside the Bell system, the Strober system or step by step system; and other type of automatic, the panel type, was developed within the system. Of recent years both of those types are employed. The equipment for the step by step is now made for the Bell system by the Automatic Electric Company, and they are making the apparatus to specifications made by the General Staff, and some real improvements have been made in the step by step mechanism, due to the work of the Staff. A very important development has been made in making arrangements whereby manual boards and automatic boards can be operated together in the same exchange area.

Mr. Dotson: Who made those developments?

The Witness: The General Staff. That included both the call indicator and the key indicator arrangements whereby the calls can be readily transferred.

Mr. Dotson: Is that method used by independent companies where they unite the automatic and manual in one system?

[fol. 7986] The Witness: I don't know of any instance where it has been used by independent companies.

Mr. Dotson: Is there any other method in use than the one——

The Witness: Yes, there is the method of going through an intermediate operator. The general tendency of switchboard development all through the manual board was to increase the features of the connections that were performed automatically, that is, the manual board has a great many functions that are performed automatically. When the subscriber takes his telephone off his hook, it automatically operates the relay and lights a light, and when she inserts the answering jack, it automatically extinguishes that light. And there are automatically operated signals in the cord circuit. At the other end of the line is what is called the full automatic, where, as everybody knows, the subscriber controls the connection by means of the dial.

Between those two there is sort of an intermediate zone where, if you take away from the operator the supervisory functions, you can make the operator still more of a machine than she is at the present time by adding equipment to the switchboard; and there is a zone in there where there is a very nice adjustment as to which is the most economical thing to do. You can save operating labor by enabling the operator to have more calls, but to do that you have to provide more costly apparatus on the switchboard, and where to do that involves a rather nice balance. There are some [fol. 7987] cases where you can put in equipment of that type. But you could not prove in ripping out an old switchboard did not have it, and adding that thing, because the added expense would be too much. That is a matter that has to be carefully considered.

Take just for a couple of examples of some of the work that the Staff has done the question of contact metals in the switchboard. There are a great many contacts that are made and opened in the course of establishing a connection, contacts in relays and contacts in keys. Now, in the early days of the business in order to prevent those contacts from burning and introducing bad joints in the connection, platinum was used, and little platinum contacts were riveted on these springs in the relays and keys. Platinum is an expensive metal anyway, and as result of the War its price went up from something like 20 or $25.00 an ounce or even less to over $100.00 an ounce. So our experts in this line set about reducing the cost of these contacts. The first step they made was to spot weld platinum on these springs in-

stead of using a riveted contact. That reduced the amount of platinum that was used by about half. Then it was found possible in certain cases to use another metal, palladium, instead of platinum, which reduced the cost 50 per cent more where that could be used. That came along in 1913.

In 1917 it became possible to use in certain cases an alloy instead of palladium, and that reduced the cost 50 per cent further. That has amounted so far—all of those improve-
[fol. 7988] ments—to a saving of between two and three million dollars in the cost of contact metals alone in the Bell system.

Q. Who planned and developed the things which resulted in those savings?

A. That was done by the General Staff Engineers. The subject of the switchboard cords which are used to connect two subscribers lines together is rather an interesting line of development. The very earliest cords that were used made use of tinsel for the conductors, and the kind of tinsel was that which was available on the market, used for decorative purposes. That was a brass tinsel.

About 1895 a rolled copper tinsel replaced the brass, and tinsel was used up to about 1902 for the conductors in these cords. The life of these cords in service was comparatively short, due to the breaking of the conductors. In 1902 a steel conductor cord was developed and put in service. It was made up of steel ribbon conductors that were laid scirally around the core of the cord. That cord had a life in service of fully six times as long as the tinsel cords which it replaced. But it had certain disadvantages. The conductors were of higher resistance than the tinsel, which tended somewhat to adversely affect transmission.

Q. What do you mean by transmission?

A. Transmission is the transmitting of the telephone waves over the circuit, and such factors as resistance and capacity and inductance, which are electrical properties of the circuit, tend to diminish the power of the waves.

[fol. 7989] Q. With what result?

A. That the sound heard in the telephone is weak; and effect of capacity and inductance is also to distort the quality and make the voice less recognizable than it is if it is devoid of those conditions, or if they are kept at a minimum. I can go into that a little more fully when I finish up this subject of cords.

Q. Yes.

A. In 1913 an improved tinsel cord was again standardized and put into general use. As a result of long continued and very comprehensive tests, it was found possible to make a tinsel cord which would last as long as that steel cord and be free from these disadvantageous qualities that the steel cord possessed.

Since 1913 work has been continuously carr-ed on to still further improve the tinsel cords, and new cords have been devised now where the tinsel conductors are still more durable, and some special tips are provided so that the cords can be connected without the soldering which was done in the old cords. That makes a saving of only a few cents per cord, but when you stop to consider that there are between a million and a half and two million cords used every year in the Bell system, why, that saving alone will amount to between $75,000 and a $100,000 a year. I mention that as being a typical instance of one portion of the switchboard equipment that has been thoroughly and consistently worked over for a great many years, with improvements and economies to show for the result of the work.

Q. Mr. Rhodes, all this work that you are referring to [fol. 7990] and have been for the last day and a half is work done by the General Staff, is it not?

A. It is done by the General Staff, directed by the General Staff, and done in connection with engineers of the Western Electric Company.

Q. Done by whom?

A. By the General Staff of the American Company in connection with the engineers of the Western Electric Company, and I will describe that relationship in detail if you would like. I can do it right now.

Q. I don't want to have to ask you each time who did or was responsible for all of these things about which you speak. I was trying to cover it with a general question.

A. The guiding hand in this cord development, for instance, in laying down what are the operating conditions which must be met, and following through the work and conducting the tests before it is finally approved and recommended, that work is done by the General Staff.

Q. Yes.

A. Now, that question you asked me about transmission, if I could take just a few minutes to go into that, it might be

interesting, as showing what the problem of the transmission engineer is.

The principle of telephone transmission is this, that when one speaks in the air against the transmitter he sets up waves of compression and rarefaction in the air. The problem of the transmitter is to transmit those waves of condensation and rarefaction into electric waves of corresponding shape. And the problem of the receiving end of the circuit is to transform those electrical waves back into waves of condensation and rarefaction in the air, corresponding in shape to those which were directed against the [fol. 7991] transmitter.

The problem of the transmission engineer is to enable those waves to be transmitted over the circuit as nearly unchanged in shape as possible. Now, by means of apparatus it is possible to photograph those electrical waves in the circuit. And I have had photographs made of the waves corresponding to three words spoken over the telephone, and I have photographs showing those words, I took wer- Columbus, Cleveland and Cincinnati.

The means of showing those wave shapes is this, that by a very delicate apparatus, where there is a coil, which is capable of moving in proportion to the strength of the telephone current, in an apparatus of that kind, if a little mirror is fixed to the moving part of this apparatus, a beam of light can be reflected on to a photographis film, and the vertical motion of that beam of light corresponds to and is guided by the strength of the telephone current in the circuit. Then if a rapidly moving photographic film is passed so that that beam of light falls upon it, it is possible to show the shape of the waves. These three words were photographed in that way on a film that was traveling one hundred feet a second. I can put those in as an Exhibit if it would be interesting.

Mr. Burr: Let the photograph be marked Rhodes' Exhibit No. 52, and it is offered in evidence.

And thereupon the photograph above referred to was [fol. 7992] marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 52, and made a part hereof.

Mr. Dotson: The only objection I have to that is that you did not incluſe the name Toledo.

The Witness: Mr. Dotson, I can show you some portions of the names of these other cities, because I have similar photographs showing the vowels O and E.

Mr. Dotson: You are getting in the neighborhood anyway.

The Witness: So I have a part of Toledo in. These were taken on a film that was moving about ten feet a second.

Mr. Dotson: Does the quality of the voice of the speaker have any effect upon the disclosure of this film?

The Witness: It certainly does, yes, sir. I can perhaps explain that a little more fully. The louder the voice of the speaker the greater if the amplitude, that is, its height above and below the central axis. If one speaks in a very loud tone of voice, the wave goes up and down. Now, the pitch of the speaker's voice is represented by the number of complete waves that occur in a given period of time, and in a second. A low pitched voice may run down to three or four hundred oscillations a second, and a high pitched voice will have some tones in it that run above three thousand a second. Now, you can have two waves [fol. 7993] that have exactly the same height, corresponding to the loudness, and exactly the same pitch, corresponding to the number of oscillations that occur in a given time, yet you are able to recognize the voice of one speaker from another. That is due to the intermediate shape of the waves.

Mr. Dotson: I notice here in the word "Cincinnati" that the reproduction of the wave is different in the two syllables, or in the syllable "Cin," which is spoken twice.

The Witness: Yes, you see from that the speaker lingered a little longer on the first syllable than he did on the second, and that accounts for the greater length.

Mr. Dotson: It was spoken a little differently.

The Witness: It was spoken a little differently, yes, sir.

Q. You referred a moment ago to a photograph showing the fluctuations in the electric current when the vowels O and E are spoken into the telephone transmitter. Is this photograph which I show you the one to which you referred?

A. Yes, sir.

Mr. Burr: It may be marked for identification Rhodes Exhibit 5-3, and we offer it in evidence.

And thereupon the photograph above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 53, and made a part hereof.

[fol. 7994] Q. Now, you were referring to the difficulties of the transmission engineer as illustrated by these photographs, but I do not think you had quite finished your reference to the subject.

A. Well, to close that up and tie it up with these Exhibits means simply this, that to the extent that apparatus is introduced in the circuit, unless the apparatus is properly designed and properly used, it tends to distort the shape of these waves from the transmitting end to the receiving end of the circuit. And the aim of the transmission engineer is to use apparatus so designed by the development engineers and so arranged and used and maintained in the plant of the associated company, that these wave shapes will be transmitted as nearly unimpaired as possible, of course, it is impossible to transmit them without the amplitude of the wave being very greatly decreased when long distance transmission is concerned, and there the waves have to be re-energized. But the aim is to transmit the wave shapes as nearly unimpaired as possible.

Q. Will you take up next, if you please, the subject of sub-station apparatus and trace its development?

A. By that we mean the apparatus that is used at the subscriber's station without including in that the transmitters, receivers, and induction coils, which I will describe separately. That is, the term is applied to the desk sets and ringers and wall sets, and the apparatus used in association with them. There the staff has brought about the development of moisture proof desk stand cords, cords that [fol. 7995] can be soaked in water for several hours without causing the conductors to be crossed. Now, that is a benefit to the associated companies, because with cords that are easily short-circuited by water there is trouble caused by leaning wet umbrellas against cords in wet weather or by having the cords wet in washing floors or leaving them near open windows when there is a rain. And by increasing the moisture proof qualities of those cords maintenance troubles have been appreciably reduced. There has also been important work done in improving the finish of desk

stands, so that they will wear a good deal longer before presenting a bad appearance and having to be brought in to be refinished. I think that is enough to show in a general way the character of work done on that subject.

Q. Have you any handbooks on the subject?

A. Yes.

Mr. Dotson: Do you know what kind of cords are used by independent companies? Are the same kinds of cords used as by the Bell?

The Witness: I am not familiar with independent practice in that respect.

By Mr. Burr:

Q. The cord, though, that the Bell Company uses, or the associated companies use, is the cord developed by the General Staff?

A. Yes, sir.

Q. Have you handbook 3851 of substation apparatus?

A. Yes, sir.

Mr. Burr: It may be marked for identification Rhodes Exhibit No. 54.

[fol. 7996] And thereupon the handbook referred to was marked for the purposes of identification as Rhodes' Exhibit No. 54.

Mr. Dotson: Just one more question with reference to cord. Do you know what the policy of the company is with reference to the use of cords in case of unification that belonged to instruments of the Ohio State Telephone Company?

The Witness: No, sir, I do not know that.

By Mr. Burr:

Q. Have you handbook No. 3853 on sub-station writing?

A. No.

Q. Well, have you No. 3855 on the adjustment of substation apparatus?

A. Yes, sir.

Mr. Burr: That may be marked for identification Rhodes' Exhibit No. 55.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhodes Exhibit No. 55.

Q. Have you No. 3859 on sub-station wiring plans?
A. Yes, sir.

Mr. Burr: It may be marked for identification Rhodes Exhibit No. 56.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhodes' Exhibit No. 56.

[fol. 7997] Q. Have you one on the subject of machine switching sub-stations?
A. Yes, sir.

Mr. Burr: Mark that Rhodes Exhibit No. 57.

And thereupon the handbook above referred to was marked for the purposes of identification as Rhodes' Exhibit No. 57.

Mr. Burr: We offer Exhibits 52 to 57 inclusive in evidence.

And thereupon the handbooks above offered were admitted in evidence on behalf of the Ohio Bell Telephone Company and are herewith submitted, marked respectively Rhodes' Exhibits Numbers 52, 53, 54, 55, 56 and 57, and made a part hereof.

Q. What, if you know, has been the work of the General Staff in connection with phantom circuits and what has resulted from that work if you know?

A. The phantom circuit is a development that applies particularly to the toll plant. Perhaps the simplest explanation that can be given of a phantom circuit is this. An ordinary physical circuit consists of two wires placed on adjacent pins on a crossarm. With those two wires placed on pins one and two on the crossarm, a conversation can be held between two subscribers A and B at each end of the circuit. Now, right alongside of that circuit you can have a second circuit of two wires on pins three and four on [fol. 7998] the cross arms and subscribers C and D can talk with each other over that circuit. Now, by connecting those two circuits together with proper apparatus and in

the proper manner, it is possible to hold a third conversation over those two pairs of wires, while the conversation previously referred to are going on, between two more subscribers, E and F, without interdering with the conversation over either of those side circuits or without the phantom conversation being interfered with by the conversation on those circuits. That is, from four wires a third circuit can be made, so that three simultaneous conversations can be carried on over four wires.

Now, the phantom circuit was first proposed about 1884. It was proposed simultaneously by an engineer in Europe and by General Carty, who is now the head of our Department of Development and Research, in this country.

Q. Was he then with the American Company?

A. No, he was not.

Q. When was that?

A. 1884. Now, for about twenty years there was very little practical use made of the phantom circuit. It was scarcely more than an interesting scientific curiosity. In attempting to apply the principle, there were a great many unforeseen difficulties. A very delicate and exact balance of the circuits and apparatus was required.

Q. What do you mean by that, the balance required?

A. It means that two windings or coils had to have exactly the same qualities of resistance, inductance and [fol. 7999] capacity and the circuits for each unit of length had to very closely correspond in their resistance, capacity, inductance and leakage. Otherwise there would be unbalancing, which would cause overhearing between the side circuits, as they are called and the phantom. It was not until about 1904 that electrical knowledge had advanced to the point where it was possible to construct this apparatus. There had been isolated cases of phantom circuits operated both in the Bell field and in the independent field, but they were not commercially satisfactory. About 1904 balanced coils suitable for this purpose were developed by the Bell engineers, and information was given to the associated companies as to the best method of transposing phantom and side circuits in relation to each other to avoid interference. From that time on the transposing of these circuits has been developed and improved, from time to time by the work of the General Staff, and new and improved phantom transposition plans have been placed at the dis-

posal of the operating companies. In the Bell system today, if phantom circuits were not available, additional copper circuits would have to be strung to carry the business that is now being carried over the phantom circuits, and the plant of the Bell system would cost in the neighborhood of eighty million dollars more than it has cost today if the additional copper circuits were required instead of the phantom circuits.

Mr. Dotson: That cost you speak of would also pertain to maintenance cost as well? Would there be a saving in [fol. 8000] maintenance cost?

A. In a way there would be because there would be in that other case more miles of circuit to be maintained.

Q. What purpose is served by the coils referred to in your answer previously made? You spoke about the adjustment of the circuits and mentioned coils in that connection?

A. They enable the current from the phantom circuit to divide itself equally over the two wires of one pair used side by side as a conductor, and the two wires of the other pair used side by side. Without that balance the phantom conversation would cause disturbance in the conversation on the side circuits.

Mr. Dotson: A phantom circuit apparatus is being used by all telephone companies independent as well as Bell?

The Witness: Yes, sir.

Mr. Dotson: What is the system or method of phantom circuits used by the independent companies? The same as the Bell?

The Witness: In a great many cases they have reproduced the coils that were developed in the Bell system, but I think that raises a point which is applicable to a great deal of the work that is done by the Staff, that after it is done somebody can come along and copy it. But I do not think that reduces the value of that service to the Bell associated companies of having it done in the first instance, because somebody else can come along and do it afterwards. [fol. 8001]

Mr. Dotson: You want to be understood then as saying that the Bell developed it commercially first of all?

The Witness: Yes, sir. Just a minute before I go on. I do not want to mislead Mr. Dotson in any way as to that question of developing it commercially. In this sense, before

these coils were available, there were phantom circuits that were used both by the Bell and the independents for commercial service in the sense that messages that were paid for were handled over those circuits, but they were not reliable and they were not satisfactory from the standpoint of good transmission. It could not be counted on to operate properly under varying conditions. They were not constant and reliable, and what I meant was that this commercial development was made by the Bell engineers and these balances were worked out and the phantom circuits became reliable and dependable things in use.

Mr. Dotson: Would you say that the independent companies developed a phantom circuit that was practical in their use at or about the same time that the Bell did, or was the Bell's invention in advance of the other by any period of time?

The Witness: Well, in so far as I remember, the phantom circuit application started and began to grow rapidly about the period around 1905, and at that time the first growth occurred in the Bell system and after that the independent growth came.

[fol. 8002] Mr. Dotson: Was this a patented process?

The Witness: No, sir.

Q. It could not be, could it?

A. No. In fact the original patents back in 1884 were never litigated.

Mr. Dotson: There was a patent issued?

The Witness: There was a patent issued to an Englishman named Jacobs and to Mr. Carty in this country practically simultaneously, and those patents were never litigated.

Mr. Dotson: You spoke awhile ago about the development of process or method by which you dispensed with the battery at the local station and furnished the energy from the central station. Was that a patented invention?

The Witness: Yes, sir.

Mr. Dotson: That was patented?

The Witness: Yes, sir.

Mr. Dotson: By the Bell Company?

The Witness: Yes, sir.

Mr. Dotson: Is that one of the patents listed in the Exhibit introduced here?

The Witness: No, because those patents have expired before this.

Mr. Dotson: Then the same method of furnishing the necessary energy in other telephone systems than the Bell system is also used.

The Witness: Well, if I get your question, there were after that time switchboards developed by independent manufacturers who sought to attain this same thing by [fol. 8003] dividing the cords, with a battery on one side and a battery on the other side, to accomplish the centralizing of the battery without the use of the cord circuits from the common battery. There were means devised for accomplishing it in a different manner.

By Mr. Burr:

Q. What is quadded cable, Mr. Rhodes, and what do you know of its development?

A. Perhaps the best approach to that would be through this phantom circuit matter which I have just discussed. For a considerable time after phantom circuits became available in the open wire plant, it was not possible to put phantom circuits in cables. That is, a line coming into a city from the open country consisting of wires on cross-arms on poles would necessarily some place within the city be carried on to the central office in cable. Now, a group of two physical circuits carrying the phantom, when it came to the cable, had to have the phantom circuit taken off on to a third pair of wires in the cable, so that where three conversations could be carried on over two circuits on the pole line, three circuits of cable were required in the cable. Naturally the obvious thing to do was to carry this phantom circuit on into the cable in a phantom group of four wires.

About 1908 the staff engineers undertook to do that, but no one knew how. The cable that resulted from the first attempts to carry the phantom principle into cable gave so great interference between the circuits as to prevent the use of such cable on a commercial scale. Our engineers [fol. 8004] attacked that problem from two points of view. One was to attempt to produce a cable having in its circuits a high degree of symmetry and balance that was required to enable the phantom circuit to be operated. The other thing to do was to determine whether cables in sufficient balance when they left the factory, could be connected up when they were installed, length to length, in a way so that

the unbalances of one length could be utilized by proper connection in the succeeding length. Now, we produced cable that could be used in that way. But still it left something to be desired, because where you got the necessary balance by compensating for an over amount or excess of one property in one length by another amount of it in the next length you produced a situation where if you had to replace a length of that cable due to the sheath going bad or water getting in, then this balance that had been worked out consecutively was lost. It required a great deal of work to determine how to twist up the two pairs, each of which was twisted individually, to twist them together so as to form a phantom group or quad of four wires.

I think it is sufficient to say that by working for a period of about four years and studying every part of the manufacturing process, it was finally possible to produce cable which had only about a quarter of the unbalance that the cables had when this problem was first attacked. In other words, they were made satisfactory for the purpose, and enough of that quadded cable has already been installed [fol. 8005] in the Bell system to show a saving of about $10,000,000 over what would have been the cost if it was necessary to provide extra circuits to bring the phantom in. That is, what this quadding principle does is to increase the circuit capacity of the quadded cables by fifty per cent.

Q. The benefits from that discovery are just beginning to be felt, are they not?

A. Well, there have been ten million dollars worth of it and it is added to every year, because the associated companies are putting in each year more and more of the quadded cable as they need it.

Mr. Dotson: Does that result in a saving of maintenance cost, traffic cost, and so forth in the operation of they system?

The Witness: It results in a saving in a maintenance cost in that you have fewer cables. The principal saving is in plant cost. That is, you have got a lower plant investment for a given number of circuits.

Mr. Dotson: Have you a model of the quadded cable?

The Witness: Yes, I have a section of the cable which contains quads of both sixteen gauge conductors, which are used on toll circuits in cable to a considerable extent and also quads of number 19 gauge cable. The proper relation

of these wires to each other to preserve the balance is securing by wrapping them with little cords, and those show in this sample of the cable. It does not look very much different in its lay-up from an ordinary cable, but if you examine it closely you can see the wires are laid in groups [fol. 8006] of four. And I have a photograph of that cable.

Mr. Burr: We offer the photograph in evidence, marked Rhode's Exhibit No. 58.

And thereupon the photograph above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 58, and made a part hereof.

Mr. Dotson: Is this quadded cable used in local service or just in the service that is extended from the open country as you spoke of into the city?

The Witness: It is a toll line proposition.

Mr. Dotson: It is all toll line.

The Witness: They may be used to some limited extent in rural lines, but generally speaking it is a toll line proposition.

Mr. Shuler: Rather than local?

The Witness: Yes.

Q. What is meant by a loaded circuit, Mr. Rhodes, and what, if anything has been done by the General Staff toward developing the art of loading telephone circuits?

A. Loading is a practical method for increasing the efficiency of telephone circuits by equipping them at periodic intervals with coils of specific design. Perhaps the best way of introducing the subject of loading is to say that cir- [fol. 8007] cuits which can advantageously be equipped with these coils will in the case of open wire circuits talk as well as would circuits without the loading having copper maybe twice as heavy. In the case of circuits in cables, to do the same thing without loading that is accomplished by means of loading, require circuits on the average weighing from seven to eight times as much, that is, a cable circuit with wire weighing twenty pounds to the mile, equipped with loading coils, will talk as well as a circuit of wire weighing from 140 to 160 pounds to the mile. So where loading can be applied it is a very evident source of real economy in the

plant. It is applicable to the longer interoffice trunks in exchanges, and it is also applicable to open wire lines.

Now, where loading does not work like a relay or repeater to bring in any new energy in the telephone current it does operate to minimize losses in the circuit. The idea of adding inductance, as these coils do, to a circuit was more or less of a vision of scientific men for a long time, and it was not known how to do it practically until two inventors practically simultaneously discovered that it was possible to lump this inductance at points in the case of cable circuits on the average perhaps a mile and a half apart, and another mile and a half along the circuit apply another coil, and by placing those coils about four to a wave length, it was possible to obtain the same results as would be obtained by spreading the inductance along the conductor, which was the impractical thing which had made it impossible to [fol. 8008] realize the saving before that time.

One of the men working on this was a man on our General Staff, Doctor Campbell. Another man was Doctor Michael Pupin, Professor of electro-mechanics in Columbia University. Doctor Pupin had a little bit the advantage over Doctor Campbell in the dates in the Patent Office, and the American Company purchased Doctor Pupin's patents.

Now, they announce the physical law which told how this inductance must be spaced. It was not possible to take those patents—this is characteristic of a good many patents—and proceed by following the directions in that patent and make loading coils that should be applied in telephone circuits. We had to put at once a group of our most highly trained men at work on the porposition of how to make coils that would realize the benefits of this invention. At first it looked as though there would be necessary electrical losses in these coils, so that only a small portion of the theoretical benefit of the invention could be utilized. For instance, there was not wire suitable to make the cores of these coils. The coils themselves we found it was possible to make most advantageously out of a core or ring of iron shaped like a doughnut. Then two copper windings were placed around this coil, each of which was inserted in one side of the circuit. Now, the best kind of wire to make those cores out of it in the beginning was not available. The quality of iron that was necessary could not be had. Our people who were working on this thing had to go into a wire [fol. 8009] factory and work with the wire manufacturers.

And the first wire that we got suitable for our use in those coils cost $36.00 a pound. It was finally brought down to about 60 cents a pound.

Q. How was that done?

A. By improvements and developing the process of drawing the wire, so that the drawing would not give it improper magnetic properties. Now, I have some samples of these loaded coils that will show what they look like.

Mr. Dotson: What is the date of the invention that was obtained on the loading coils? About what year?

The Witness: It was about 1900 or 1902. And I might add right there that those fundamental patents of Doctor Pupin have expired, but the art is covered by a large number of detailed patents covering the process of manufacturing coils, and improvements in the coils which have resulted from the development work in improving the invention. Now, ther- is a complete cable loading coil. All that you can see of it is this copper winding which goes around the core, and the two terminal wires whereby one half of this winding is connected into one side of the circuit and the other half into the other side of the circuit. Now, within this copper winding is a core of iron wires. You can see it in this little section I hold, surrounded by a tape to hold the core in place. But if I remove a little of that you can see these purple wires. Now, this particular core contains about 70,000 turns of wire, which is 4/1000 of an inch in [fol. 8010] diameter. That is, in that coil there is about ten miles of that wire. Now, in order to prevent electric-l losses in the core, it is necessary to prevent electrical currents from circulating within the core itself, and that is accomplished by coating each individual strand of the wire with a compound in the nature of shellac, which gives it this purple color, and it is sufficient to insulate each one of these turns from the other.

Now, I have here one of the same coils which has been sawed apart in order to show the way this wire looks in the core, and I have on this little spool a sample of the wire itself which shows how fine it is.

Q. About as thick as a horse hair?

A. Something on that order. Exactly that is 4/1000 of an inch thick.

Mr. Dotson: This is the latest circulating medium.

The Witness: That is not the latest form of that coil. I am coming to another one.

Mr. Dotson: Mr. Rhodes is this same invention used by independent companies?

The Witness: No, sir.

Mr. Dotson: That you are describing?

The Witness: Not so far as I know.

Mr. Dotson: Do they use any similar mechanism?

The Witness: Not as far as I know.

Mr. Dotson: Do you — what became of the Campbell invention?

The Witness: That application was abandoned, I think, [fol. 8011] in favor of the Pupin one, which antedated it in the office.

Mr. Burr: The figures showing the model of the cable loading coil and section, wire core type, may be marked Rhodes' Exhibit No. 59, the one showing wire core for cable loading coil and wire for core before insulation is added may be marked Rhodes' Exhibit No. 60, the one showing cable loading coil and section, iron dust core type, Rhodes' Exhibit 61, the one showing irondust core and one of the rings, Rhodes' Exhibit 62, and we offer Exhibits 59 to 62 inclusive in evidence.

And thereupon the photographs above referred to were marked for the purposes of identification and were offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhodes' Exhibits Numbers 59, 60, 61 and 62 and made a part hereof.

The Witness: Now, although this invention was made in the early part of the century, a number of years of very intensive work was required to bring it to a perfection, and by "Perfection" I do not mean its final stage, because it is characteristic of this as of a great deal of our work that there is progress to be made and is being made most of the time. At the time of the War the supply of loading coils to the associated companies was seriously threatened. This very fine wire that was used in the cores of these coils was [fol. 8012] made by drawing it through a hole in a diamond, and these diamond dies came from Germany. The supply was cut off. It was a very fortunate thing for the supply of these materials that we had already started work to improve and cheapen them. Now, the nature of that work

consisted in substituting for this wire core a core that was made up of rings.

I have here the core itself containing seven of these rings, and here I have some individual samples of the rings themselves. Now, those rings look on the surface as though they were made of ordinary iron, perhaps cast. As a matter of fact they are made out of compressed tiny particles. They seven rings in a core of this kind contain about thirty five billions of these little particles, that is, it would take 1400 of each particle placed side by side to make a line an inch long. Those are made out of a very pure iron, which is made by depositing the iron electrolitically and then grinding it up to a powder and then insulating it by an insulating compound and compressing it under enormous pressure into these rings. The result of that was to enable the supply of loading coils to be kept up and at the same time the cost of the coils to them was reduced. This process of making coils was covered by a Bell system patent which was issued in 1918. Now, in order to show that those rings are not made, as they appear to be, of solid iron, you gentlemen can take those if you want to and break them.

Q. Am I right then, Mr. Rhodes, in saying that with reference to Exhibit 62, by this process of pulverizing or pow- [fol. 8013] dering iron and subjecting it to the shellac insulating method, you have been able by that comparatively simple method to do away in one single coil with say ten miles of this finer drawn and insulated iron wire?

A. Yes. I might say in the entire plant of the Bell Company if the efficiency which has been attained by means of these loading coils had had to be attained by means of larger wires with the same transmission results that are obtained today, the plant would have cost approximately one hundred million dollars more than has been the case today. Now, there is a saving which is not very largely shown in the Long Lines plant except in some Long Lines cable, because in the open wires we are accomplishing the results by means of repeaters, which I will come to later. There is a very wide application of these coils in the trunk line plant in the larger cities, such as Cleveland, and they are used to some extent in the toll line plant of the Ohio Bell Company in the rest of the state.

Q. Can you tell the saving per coil with one made out of

these circular rings on the one hand and the continuous iron wire on the other?

A. It is my recollection it is somewhere in the vicinity of a couple of dollars of coil, but I am not perfectly certain as to that. I would not want to state it definitely offhand. It did make an appreciable reduction in the cost, and I can say right there that there is work going on now by which we hope to bring the cost of these coils still further down. [fol. 8014] Now, it is an interesting thing to see this effect. The art of applying loading to cables where toll lines are necessarily brought in to a city. Before this invention was made available, in order to secure proper transmission it was absolutely necessary to bring the toll lines down just as close to the central office as possible in open wire construction. It was only the development of the loading coil that made it possible to use cable in these lines. And I have got a picture showing what it would mean in New York City to bring these lines down pretty close to the central office. That is the kind of pole line we would have to have, and it shows the way the city streets would have looked if this invention had not been made available.

Mr. Burr: The photograph may be marked Rhodes' Exhibit No. 63, and is offered in evidence.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit No. 3 and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company and is herewith submitted and made a part thereof.

The Witness: They were 90 foot poles and carried 330 wires. Now, I think it is not without interest in this connection to mention how one important invention works in with another. Long after loading had been developed it could not be applied to phantom circuits. You could load [fol. 8015] the side circuits of the phantom, but you could not load the phantom circuit itself. And in order to load phantom circuits, so that you could load three circuits out of a group of four wires, was another very difficult problem that required a continued effort of some of our most highly trained engineers before they could develop coils so that it was possible to load not only the phantom but the side circuits as well. There are, as I mentioned, a very considerable number—I should say over 50—live patents covering

improvements that have been made in the art of loading. They cover the details of the design and manufacture, various methods of enclosing the coils in protective covering, and such matters as the construction of this type of core and the development of the phantom loading coil.

Q. What has been the work of the General Staff in connection with the development of repeaters or amplifiers and what effect has that had on the telephone art?

A. The first successful telephone repeater was invented by a Bell engineer and tried out on a circuit in the vicinity of Boston in 1904. An improved form of that type of repeater was commercially operated in the latter part of the same year on a circuit between New York and Chicago.

Q. What is a repeater and what is its function?

A. A repeater is a device for picking up the attenuated telephone current when it becomes very weak, supplying it with new energy and sending it out with this increased strength over a section of the line, that this wave shall be [fol. 8016] unimpaired. And that process can be continued for a number of stages, so that by means of this amplification at intermediate points it has been possible as everyone knows to transmit satisfactory talks across the United States.

Q. Could it have been done without the invention of these repeaters?

A. We did talk on loaded circuits, as far as Denver, but the results would have been very unsatisfactory on the coast to coast circuits. The first repeater was of a mechanical type. It was apparatus where the essential working part of a receiver was connected to a transmitter so that the current coming in over the line and passing through this receiver mechanism, instead of sending out sound in the air, actuated the working parts of a transmitter and provided for the supply of new energy. The transmitter itself is to a certain extent an amplifier. *But* that I mean it gives out more electric energy on the line than voice energy it receives from the lips of the speaker. That energy is supplied by the battery or other current producing means that operate the transmitter. In these mechanical repeaters we found that the results were not wholly satisfactory, and where you went on through a series of these repeaters and quality of the sound became very appreciably impaired. That was due to the fact that this mechanism had mechan-

ical inertia and energy was absorbed in actuating this mass of material, even though it was made as light and delicate as possible. So that it was apparent that we would have to get away from that mechanism and get into the region of [fol. 8017] what are known as electrons. The vacuum tube had been devised by Doctor DeForest for wireless telegraph purposes, and although in the form in which he had it it was not suitable for a telephone repeater, it offereed the means of progress. So we obtained the rights to use that for telephone purposes and set to work some of our ablest scientists to develop it and perfect it and make it useful over our lines. There was an instance where we turned to the most recent development in science and found a solution.

We have done a great deal of work in perfecting these cacuum tubes for use in the telephone plant. Among other things we have increased their life from about a thousand hours, which they had at the beginning, to over 20,000 hours at the present time.

Now, the application of that repeater in improving telephone transmission is particularly interesting in this respect. There were a good many people seeking at that time to improve transmission, and their ideas were to employ special and very ingeni-us forms of transmitters at the substations and very powerful batteries. That meant that any station that was going to make these long talks would have to be equipped with this special and expensive arrangement, and the volume of the sound produced was so great that to avoid cross talk, it would have meant serious changes in switchboards and in cables. We concluded from studying the subject that that was not the best way to increase the range of transmission; but the way to increase it was to im- [fol. 8018] prove the line itself, and I think it is a very satisfactory solution, that the capability of talking to any portion of the United States from these cities in Ohio has been realized without requiring the Ohio Company to make any change in its sub-station or central office or line equipment. Repeaters are used to some extent by the Ohio Company for its down connections wholly within the State of Ohio.

I have one of the vacuum tubes, which constitutes the essential element in the repeater. It is interesting, as it is the same type of tube in a general way that is now used in radio sets. This development was made back in the year

1910, considerably before broadcasting became popular. This repeater bulb by itself is by no means the entire equipment necessary in operating repeaters. I have a picture of the repeater bulb and socket itself, and another picture showing a set of sic repeater units, in which in each set the two repeater bulbs appear in the upper lefthand portion of the panel.

Mr. Burr: The photograph showing the repeater bulb may be marked Rhodes' Exhibit 64, and that showing the repeater installation just referred to by the witness, Rhodes Exhibit 65, and they are offered in evidence.

And thereupon the photographs above referred to were marked for the purposes of identification and were offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked re-[fol. 8019] spectively Rhodes' Exhibits Numbers 64 and 65, and made a part hereof.

Q. Describe briefly, if you will, the development of carrier current telephony under the direction of the General Staff.

A. That is an improvement whereby it has become possible to carry on five simultaneous telephone conversations over a single circuit, four in addition to the one that is normally carried on. It is a different proposition from phantom. The carrier is accomplished by mixing each one of the telephone currents with a high frequency current. One would be mixed with a current of 10,000 frequency, another with 15, another with 25, another with 30. Those all go on simultaneously over the same wire, and there are means, somewhat like selective filters at the receiving end, whereby each one of those high frequency currents is separated into its own channel and then the high frequency or carrier current removed, and the original telephone conversation left on its own channel?

Mr. Shuler: Is that used in local service?

The Witness: No, it is used in toll. At the present time the terminal apparatus that is necessary to bring this about is relatively extensive, so that for distances of less than 300 to 350 miles, it is more economical to string another circuit than it is to operate this carrier system. But it is in the stage now that a great many of these improvements have been in in the past. That is, our problem now is to

[fol. 8020] seek to reduce the cost of this terminal apparatus, and we are engaged on work now in which we are hopeful of making a very substantial reduction in its cost, so that it may be applicable to circuits down to 50 or a hundred miles in length. That is the problem that confronts us now to extend the range of its application by cheapening the cost of the terminal apparatus.

Mr. Shuler: But none of that expenditure is for local telephones?

The Witness: Not on that portion of the work. We cover the whole field of telephone work, exchange plant and toll plant as well.

Q. Tell very briefly what the General Staff has done, and is now doing on the subject of radio telephone.

A. There our problem has been to be sure that we were at all times provided with such rights and such apparatus as would enable the associated companies to make such use of radio as may turn out to be desirable in their plants. The problem comes up of maintaining telephone communications with vessels at sea or vessels in the lakes, with the cities along the lakes or ocean shore.

By means of this repeater installation and development it became possible in 1915 to transmit speech by radio from Washington to Paris in France across the Atlantic and as far as Hawaii on the other hand in the Pacific Ocean. That was in 1915.

We have since been studying with a great deal of care [fol. 8021] the developments in radio, and it became possible a year ago last January to maintain a one way talk for two hours across the Atlantic from New York to London. The speakers in New York were distinctly heard because everything that they said was cabled back and checked up pretty well. In fact the head of our department in talking at one time cleared his throat, and the London papers the next day carried an item that he was the first man who had ever coughed across the Atlantic.

We do not know what the extent or limitations of radio may be. It does not look a- though there would be a possibility of an extensive field in the vast telephone traffic of the United States, where we are handling a daily average of about 35,000,000 calls. It looks as though its applica-

tion would be for uses where it is not physically possible or else extremely expensive to construct and maintain wire plants. But for communications from ship to shore or between cities and airplanes there is a field for it. The [fol. 8022] available wave lengths are so limited that it looks as though it would be the only thing to do to restrict its use to such fields as wire telephony cannot be practiced in. But we regard it our duty under this work we are taking up and pursuing to be able to advise the associated companies as to the use of such things.

Q. Have you assured to the associated companies the right to make use of such apparatus?

A. We have very extensive patents, so that the field will be kept open.

Mr. Dotson: The immediate possibilities of that would be only in long distance service.

The Witness: Such service as the company might wish to give to vessels in the lakes.

Mr. Dotson: I mean on land.

The Witness: Yes, it would not be an exchange service proposition, no, sir.

Q. What is contemplated by the term, "Fundamental plans" and what service does the General Staff render for the associated companies in regard to fundamental plans?

The Witness: Answering the first part of that question, a fundamental plan manifests itself when completed in a map showing what the general layout of the telephone plant in a city is expected to be at some definite time from 15 to 20 years in the future. It shows the number of central office districts that will be required to provide the most advantageously. It shows the expected boundaries of these central office districts, the anticipated best location for [fol. 8023] the central office in each district, to enable the service to be given with a minimum amount of cable plant, and the proper locations in streets and alleys and the most economical number of conduits, of ducts when underground construction is entered into, in order that the plant may constitute a comprehensive distributing system reaching every city block that is to be conserved by underground cable.

Q. You may proceed.

A. I had gotten as far as to explain what a fundamental plan covered in a general way. Now, that question of the office districts and the location of offices and the best location and number of ducts for subways are all very definite questions that confront the executives of a telephone company when plant extensions are required.

Q. You are speaking now of the associated company?

A. Of the associated companies, yes, sir. The fundamental plan is therefore a guide to the management of the associated companies when they have to provide any of these improvements and expensive elements of plant, and they utilize these plans to the end that these plant additions shall be of the proper sizes and at the proper locations in order to conserve the requirements of the city with the greatest degree of economy. Now, the necessity for a fundamental plan arises from the fact that the normal condition of a telephone system is one of continual growth. Usually the number of telephone stations and the amount of telephone traffic grows more rapidly than does the population. In building the telephone system in a city like any [fol. 8024] one of these important Ohio cities, it would be impractical and uneconomical to limit the construction exactly to the present day needs.

For example, if in order to serve a particular locality, the telephone company must now place underground conduit, it would be a mistake to provide only the exact number of ducts that are required at the present time, assuming that future growth is expected. It would be most uneconomical to install more than the number of ducts required. That is, I mean it would not be economical to put down one duct this year and another one next year and another one the year after, because money would obviously be wasted in re-excavating and repaving the streets. On the other hand, instead of adding one duct a year, it would not be an economical thing to put down enough ducts to last for the next 50 or a hundred years, even though you could estimate the future with anything like a reasonable degree of accuracy for that length of time. In that case the return on the capital and other fixed charges would more than offset the saving that would result from frequently digging up and re-surfacing the street. Now, somewhere between those two extremes is the most economical amount of ducts to place. And under average con-

ditions it works out that it is most economical to build conduits for about 15 to 20 years ahead.

Q. Who first discovered that and how?

A. Our General Staff engineers sometime ago, and they have since checked it up, have estimated for a given num-
[fol. 8025] ber of years ahead what the costs would be, and have found that there is a minimum for that period of time. Now, that all carries you back to the expected growth in the number of stations and in the amount of the traffic. One way to do would be when you are going to put down conduit to have your conduit foreman and somebody else go out and look up and down *and* street and say, "We ought to put down, I guess, about six or eight or ten ducts." The other way is to make a careful estimate of the probably growth of population and the probable use of the telephone, to determine in that way a careful estimate of the probable future business. And it works out that a method of that kind on the whole gives much more reliable results than a pla-n guest would give. Of course, if we could get a guaranteed grade A prophet anywhere, the telephone company would like to employ him on its staff. But in the absence of that. The next best thing for us to do is to make these careful studies, and a careful forecast is better than a rough guess.

Now, — we do is to make a commercial survey, which is a forecast of the future community, showing the probable amount, distribution and character of the future population, the business firms and telephone users. The first thing that is done is a telephone census of the existing users and what is termed a house count is made of the community. That is, it is found on the whole the use that is made of the telephone, the class of service that is chosen, bears on the whole a fairly close relation to the amount of rent
[fol. 8026] or the equivalent of rent that is paid for the houses in which the users live. Then the present users are classified into residence telephones, business telephones in the residence area, and telephones in the business district. For families they are divided into private residences, two-family houses, apartments and boarding houses. Then the same classification is followed in detail in the business sections. From all that information careful forecasts are made, combined with the estimates of the probable future population to give an indication of the probable future use of the telephone.

Now, each city required special study, as there are no uniform rules or formulas that can be substituted for judgment and experience in making these forecasts. Each city requires special study, as there are no uniform rules or formulas that can be substituted for judgment and experience in making these forecasts. Each city has its own reasons for its past growth and each will have its peculiar reasons governing its future growth.

Mr. Dotson: To what extent does the element of cost of service enter into the survey?

The Witness: It comes in as a very important factor and the best information possible as to the future cost of service is made by the commercial department people who have this in hand.

Mr. Shuler: How often have you made a survey in Cleveland?

The Witness: The last one that was made was in 1921.

[fol. 8027] Mr. Shuler: When was the one previous?

The Witness: I don't know that I have a record of that.

Mr. Shuler: How many have you made in ten years?

The Witness: It would be unusual if more than one were made. That is, they are made at a time when there are some major extension- contemplated. That is, we do not make them for the full fifteen or twenty year period and then let the thing run to the end of that time, but when it appears that conditions have changed enough so that another study is justified, that is made.

Mr. Dotson: Have you made a survey of Toledo?

The Witness: Yes, there was one made in 1920.

Q. Was that made with reference to unification?

The Witness: I can't say. I am not sufficiently familiar with the detail, but in most cases they have been so made. There was one study that was made for Springfield in the year 1905, and what we call the ultimate date for that study was in 1920. That is, in 1905 the prediction was made as to what the population would be in Springfield in 1920. In 1905 the prediction was that there would be 60,000 people in Springfield, and it is my impression that it has worked out fairly closely to that in the 1920 census.

Mr. Shuler: How many surveys have you made in Ohio in the last ten years?

The Witness: Akron, Cincinnati, Cleveland.

Mr. Shuler: Cincinnati is not your company.

[fol. 8028] The Witness: You asked me in the State of Ohio. Cleveland, 1921.

Mr. Burr: That company does pay the four and a half.

The Witness: 1922; Toledo, 1920, Youngstown, 1919. Those are the surveys in which the American Company has corporated in the field work with the local company. I cannot say how many the Ohio Bell itself and its predecessor have made with their own people.

Mr. Shuler: I mean the A. T. & T.

The Witness: These are the ones in which we have co-operated directly in sending men out here in the field, and with the excepting of Cincinnati, leaving that out, we had men out here a total of 3,352 days. Their expenses and board and all that were paid by the General Staff while they were on the work.

Mr. Shuler: That is in how many years?

The Witness: That covered studies in 1919, 1920, 1921 and 1922.

Mr. Burr: Five years.

The Witness: Three years.

Mr. Shuler: I am talking about the ten year period.

The Witness: I haven't it back of that.

Mr. Kinnison: Was there any charge for the services and expenses of those men that you sent out in the field?

The Witness: No, that is paid by the General Staff. Our people who are in this work are concentrating on the proposition of doing as much work as possible, of the funda-[fol. 8029] mental work involved in this, the principles involved, the growth of population and the best methods to be followed in making these plans—the associated companies have followed up with their forces in doing this work, so that they have an organization doing it, and our work is concentrated on the fundamental propositions involved. A number of circulars have been prepared and sent out. Here is one in February, 1923 on the subject of commercial surveys.

Mr. Shuler: Just to get the record straight, these surveys you speak about were not all made by the A. T. & T. General Staff, but they simply co-operated with the engineers of the local companies.

The Witness: Yes, sir.

Mr. Shuler: So that you do not give them all the information on surveys?

The Witness: We give them the information on the

methods, and in these that I spoke of we have cooperated in the field work. But in general the division of the responsibility is that the general basis methods are worked out by the central organization and the field work done by the associated companies, although in these cases they did call on us for cooperation and we furnished the cooperation in the field. Now, this circular shows the forms and methods that have been worked out as a result of experience, showing the most accurate and most economical methods for making these commercial surveys. There is a series of [fol. 8030] these. I only brought out this one which is entitled Commercial circular No. 39, commercial surveys and analysis of a multi-office or large single office community.

Mr. Burr: That may be marked Rhodes' Exhibit 66, and is offered in evidence.

And thereupon the handbook above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit No. 66, and made a part hereof.

Q. Are there other commercial circulars which have been issued from time to time by the General Staff?

A. Yes, sir. There is one recent one which I did not bring out which is a very careful estimate of the future population of the United States by sections for the year 1950, the mid-century, taking account of the best study that it has been possible to make of all such factors as immigration and the increasing tendency of Urban populations to grow faster than rural populations, and matters of that kind.

Q. What has been and is being done by the General Staff in the matter of the standardization of materials, apparatus and methods?

A, That is a very important function of our work and perhaps the best introduction that could be made to the subject of standardization is to just say a few words about what occurs in a telephone system where standardization is comparatively little advanced. Now, that happens to [fol. 8031] be the state of affairs in the French telephone system. It has been said that in France telephoning is little more than an adventure in a complex of silence and blasphemy. The condition in France is that the subscribers buy their telephone instruments from manufacturers. The

telephone administration, the Government administration, has approved about 150 types of telephone instruments made by about 25 different manufacturers, and all these manufacturers have done the best they could to get new types approved and to sell them to subscribers. Now, from time to time some of these manufacturers have discontinued making certain types of telephone instruments, some because it did not pay to make them any longer and some because they failed and went out of business.

That has put the subscribers in a very bad position, because they could not get parts for the replacement of those instruments. In France instruments are installed by Government employees. The subscriber, as I said, buys his instrument and the Government maintains it. It has been very difficult to familiarize the inspectors with 150 different types of instruments, and it is difficult to carry in stock the parts that are necessary for repairs. So when the subscriber has some difficulty with his instrument, he reports it to the telephone administration, and when they get around to it they send a man to the subscriber's premises to make an inspection. He often reports that the difficulty is not in the Government lines, but is in the subscriber's instru- [fol. 8032] ments, and perhaps they try to correct the fault. If they do not succeed they tell the subscriber he has a bad set, and he ought to take it up with the manufacturer that he bought it from. So he goes to the manufacturers and says, "That set you sold me such and such a time is a bad one. What are you going to do about it?" So the manufacturer sends somebody to look the set over, and he finds the difficulty is not in the set at all, but in the Government lines, and it is a common fact for that responsibility to be passed back and forth.

The result is, of course, loss of time to the subscriber, and inconvenience to all other subscribers who want to call him. With so many different types of instruments it has been found impossible to establish a different standard of transmission, and it often happens in connection with one subscriber, the service is good and perhaps with the next one it is very bad. On account of the difference in the range of the instruments it has not been possible to use the minimum amount of copper in the trunk lines, but the trunk lines have had to be made sufficiently expensive in order to handle the weak transmission from the poor stations.

Now, of course, the Bell system in the United States is

standardized, and that standardization is done through the General Staff organization. Unless that existed, to recommend standards, there would be a multiplicity of types for each of the thousands of pieces of apparatus that are used in the telephone system, and there would also be the same [fol. 8033] state of affairs in regard to methods of operating, which would result in a lack of efficiency and economy in many things.

One of the results of this standardization is that it makes the best available for all. It also reduces the cost of apparatus to the associated companies, because the same thing can be made in the larges quantities and most economically. As manufacturing proposition uniformity in output contributes economy in production. Standardization also reduces the cost of carrying stocks of materials and the cost of maintenance and repairs, because fewer parts have to be carried than if there were a multitude of different types of apparatus. It also reduces the cost of construction to new employees, because there are fewer things to get acquainted with. It reduces the cost of plant account, because there are fewer things to be kept track of.

It has another advantage, in that it renders available enormous stocks of supplies, material and labor in the event of emergencies. That is, if there is a wholesale destruction of a plant as the result of some calamity like a flood, it is possible to bring in materials from a distance which can be erected and fit in with the plant that is already there, and it is possible to bring in men from a distance, even from another company, who can erect that material, because they are using materials with which they are all familiar in their own territory.

Now, we do not have merely one standard and try to [fol. 8034] force the business arbitrarily into that particular mold. We do have as many standards as varying conditions require, and they are changed whenever it is to the advantage of the associated companies to do it, and we clearly recognize that there are frequently special conditions where no particular standard is the best thing to use, and there we very frequently on the request of the associated companies give them advice as to what is the best thing to do under those conditions.

I would like to stress particularly that point that our standards are dynamic and not static. We are dealing in this telephone business with a living organism, as continu-

ally growing thing, and we must endeavor at all times to keep our specifications and our methods and our apparatus under review, to see whether they stand the test that each day applies to them.

Now, a change in a specification or a standard does not mean a verbal change in that document that can be easily made by changing some words in it, but it does mean that everyone of those changes must be carefully considered, to see what the effect is going to be, not only on that piece of apparatus, but other apparatus that it has to work in connection with.

Very frequently our standards for materials have to be changed on account of changes in the prices of basic materials. Something like silk, for instance, which is used in various places in a telephone plant, may become relatively [fol. 8035] very expensive. We must immediately get busy and find what can be done to avoid its use or to make the best substitute for it. And that means that in order that the associated companies will not get into trouble from using something new, that tests must be conducted over a sufficient interval of time, accelerated and other tests, in order to determine that that particular new thing they are gonig to use is not going to be ultimately a source of trouble.

Mr. Shuler: Do you forget to mention the value to the A. T. & T. of standardization?

The Witness: You mean in the Long Lines plant?

Mr. Shuler: Yes.

The Witness: Oh yes, it is very valuable, too.

Mr. Shuler: It is very valuable to Western Electric, which A. T. & T. owns.

The Witness: No, I don't think so. I think the Western Electric Company would make more money if they were making 150 different things than one.

Q. And the Long Lines pay for the services under the license contract just the same as one of the associated companies?

A. Yes.

Mr. Dotson: Speaking about the Long Lines paying four and one half per cent, I have been wondering about the ownership of those lines. You mean the toll lines.

The Witness: I mean the lines that connect the territories of the different associated companies broadly, yes.

Mr. Dotson: Yes, who owns those lines?

[fol. 8036] The Witness: The American Telephone & Telegraph Company, Long Lines Division.

Mr. Dotson: In their own name or by some other name?

The Witness: No, in their own name. I think that they are owned generally by state sub-divisions of the A. T. & T. Company, but it is operated as one system.

By Mr. Burr:

Q. For example in Ohio is the Ohio Telephone & Telegraph Company, is it not?

A. I am not sure, but I think it probably is because in general there are state organizations, following state lines.

Mr. Kinnison: Separate corporations?

Mr. Shuler: Yes.

Q. Describe if you will please, the instrument services performed by the American Company for the Ohio Bell Telephone Company.

A. Another portion of this service under the license contract consists in furnishing the associated companies, such as the Ohio Bell Company, with all of the transmitters, the induction coils that go with those transmitters and the receivers that are used by the associated companies in giving service. It includes the instruments required for use at subscribers' stations, at operators' switchboard positions, for wire chiefs' desks and test men's use, also at private branch exchanges. Now, that includes replacing without cost all instruments that are accidentally destroyed or injured. It includes repairing these instruments when there is anything wrong with them. Whenever a general improvement in the type of instrument is made and a new type [fol. 8037] of instrument is brought out, the Ohio Company under the present arrangement is free to return the instruments of the older type, and without additional charge to obtain instruments of the new type. In other words, they are free to exchange instruments of one type for another whenever from their viewpoint it is desirable to do so. The services also provides for a surplus or working stock of instruments in the hands of the Ohio Company, to enable it to meet current demands. The Ohio Company also has the advantage of a further stock of instruments, which is maintained by the American Company to insure the continuity of supply of these instruments and to provide for extraordinary contingencies, that is, so that if there is an accident

to the factory where the instruments are made, that there will be no hold-up in the supply of the instruments. Now, that assures the Ohio Company always of an adequate supply of instruments, and with no temptation for the sake of economy to keep them in use longer than the best interests of the service will permit. It gives them an assurance that its instruments at all times will be a class suited to the conditions of use, and it carries with it the standardization of types of instruments which is essential to the best service.

Mr. Dodson: Who maintains the instruments in the way of repairs or any expense that enters into the keeping of the instrument fit while in use.

The Witness: What happens where an instrument is unfit, the Ohio Company returns that instrument to the Ameri-
[fol. 8038] can Company and gets a new instrument in its place. The American Company, if it is capable of being repaired, we will repair it, if it can be made as good ad a new instrument. Of course, the American Company does not provide a man to go out to the station where that instrument is and take it out and put in another. The Ohio Company does that and sends it back to the company and gets a new instrument in its place.

Mr. Dotson: That is one where it is not fit for repair.

The Witness: Well, if they need some parts, if the mouthpiece breaks or the shell of the receiver breaks, they are provided without additional charge with these parts. The American Company has also from the beginning assumed the obligation of developing the art of transmitters and receivers, so that they will be made continually more efficient and effective. The first instruments, of course, were very crude, and it was possible to talk just a few miles with them. There were various types of instruments that were used in the beginning, from this instrument I showed you yesterday, the first instrument of Professor Bell, down to the time that the Blake transmitter came in about 1878, and I have one of the old Blake transmitters.

Now, when that instrument took the place of the instruments that preceded it, it was a very great improvement. It gave clear transmission, not very strong transmission, but clear transmission. It was a difficult instrument to maintain in adjustment. Development work was done then on an instrument which employed granular carbon for the
[fol. 8039] working portion of the instrument. The Ameri-

can Company obtained the patent rights of an Englishman, Henry Hummings. He was an English clergyman who did some experimenting and found granular carbon as the essential instrument was a great improvement over carbon in solid blocks. After acquiring those rights it was found that the efficiency of the instrument fell off very rapidly. So the men on the General Staff who were concerned with this problem had a difficult development proposition to employ that granular carbon proposition in an effective instrument. There was one that was finally devised by a member of the General Staff, known as the solid back transmitter, and I have one of those early instruments.

Mr. Burr: The photograph of it, if you have one, may be marked Rhodes' Exhibit No. 67.

The Witness: I have one.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit No. 67.

The Witness: That was known as the solid back wall set, or the Number 239 instrument and the induction coil was contained in this swelling in the base of the instrument.

Mr. Burr: It may be marked Rhodes' Exhibit No. 68.

[fol. 8040] And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit No. 68.

The Witness: Now, I will only show some of the principal types of instrument which came along and succeeded this. The next instruments which came along from 1900 to 1904 were adopted for use on common battery lines. There was first the 242 bracket instrument, this instrument that had the cord on the outside of the arm.

Then in order to reduce the maintenance troubles of the associated companies, another type, 250, was brought out, which had the cord concealed within the arm.

Mr. Burr: The photograph of No. 242 may be marked Rhodes Exhibit No. 69, and of 250 Rhodes Exhibit No. 70.

And thereupon the photographs above referred to were marked for the purposes of identification respectively as Rhodes' Exhibits Numbers 242 and 250.

[fol. 8041] The Witness: Now when the desk stand at the subscriber's premises began to become popular, there was a type of instrument, consisting of the transmitter head alone, which was known as the 229 instrument, which began to go into service about 1902, and as a matter of possible interest I brought along a cross section of that instrument, where it is sawed in halves and put in a glass case so that its construction is made clear, and from that it is possible to explain the operation of the instrument if anybody is interested in it. I have an enlarged picture of that cross section, which shows the operative parts of the instrument.

Mr. Burr: The photograph of transmitter Number 229 may be marked Rhodes' Exhibit Number 71, and that of the cross section of transmitter Number 229 may be marked Rhodes' Exhibit Number 72.

And thereupon the photographs above referred to were marked for the purposes of identification respectively as Rhodes' Exhibits Numbers 71 and 72.

The Witness: Now along about 1913 an improved form of this transmitter came along, which talked better than the one that preceded it. This was Number 329. As far as the external adherence goes it is not very different from the 229.

Q. Have you a photograph of it?

A. Yes.

[fol. 8042] Mr. Burr: It may be marked Rhodes' Exhibit Number 73.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 73.

The Witness: A still further improvement in the transmitter, which made the instrument talk appreciably better than the preceding one, came in the 323 instrument, which became available in 1918. This is the 323 instrument.

Mr. Burr: The photograph of it may be marked Rhodes' Exhibit Number 74.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 74.

The Witness: And in 1920 came 337 type, which is an instrument of especially high efficiency and is useful in t

plants of the associated companies on particularly long subscribers' lines. Now right in that connection——

Mr. Burr: Just a moment. The photograph of it may be marked Rhodes' Exhibit Number 75.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 75.

[fol. 8043] The Witness: Now I would like to at this point, point out that these improvements in the efficiency of the transmitter have made it possible for the associated companies to use an increased amount of economibal small gauge cable in their plant, and still give the subscribers a satisfactory degree of transmission, so that the improved instruments have resulted in real economies in the plant construction costs.

Q. What organization worked out the improvement in these transmitters?

A. The General Staff Engineers of the American Company.

Mr. Dotson: Were all these improvements covered by patents?

The Witness: Many of them are, these instruments of later dates; the essential features, are covered by patent in these later instruments.

Q. Are those transmitters referred to by you in your recent answers the only ones that have been developed from time to time by the General Staff, or are there others?

A. No, there are others. There have been not less than 66 different types of transmitters that have been standard previous to the present standards. Many of them have special uses, but they have been standard and are now obsolete; and I have a picture which shows some of these instruments which have been standard at various times in the past.

[fol. 8044] Mr. Burr: It may be marked Rhodes' Exhibit Number 76.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 76.

The Witness: Now the development of these instruments has carried with it a vast amount of work on the carbon

that is used in the button of the instrument, both in the granular carbon itself and the carbon that is used in the front and back electrodes, two little disks which you can see in the section of the instrument.

Q. That is in Exhibit 72?

A. I am not sure as to that.

Q. In the cross section?

A. Yes, in the cross section. The method of treating the carbon to secure the best results and the design and dimension of every instrument, has been the subject of experimental work. There is no way that it can be worked out in advance scientifically. These improvements have got to be made by cut and try methods, and the process of that experimental development has naturally to be a slow one, because various combinations have to be tried, and comparatively small changes in the dimensions and proportions of the parts will have a very profound effect on the character of the talk given by the instruments. Now in addition to these instruments there are special types which are more expensive, that are provided for operators, and the associated companies get those on the same ar- [fol. 8045] rangement that they get the others under the license contract. With these instruments is furnished an induction coil, which is made with an iron core and two copper windings, and it connects the transmitter and receiver together in the most effective manner. And I have here one of the Number 46 type of coils, which is the latest type used, and I also have a picture of this Number 46 coil.

Mr. Burr: The picture may be marked Rhodes' Exhibit 77.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 77.

Mr. Burr: And at this time we offer in evidence Rhodes' Exhibits 67 to 77 inclusive.

And thereupon the photographs above offered were admitted in evidence on behalf of the Ohio Bell Telephone Company, and are herewith submitted, marked respectively Rhodes' Exhibits Numbers 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, and 77, and made a part hereof.

The Witness: Now the same line of development or a development of the same kind as that which has occurred in transmitters has occurred in the case of the telephone receivers. They type of receiver that was in *the* use when I came into the business was the Number 101 type, the [fol. 8046] old single pole hand telephone. By single pole I mean this. The instrument contains a long bar magnet, and there is a pole piece on the end containing the wire itself in the telephone circuit. That magnet attracts the little iron diaphragm and holds it in place, and the re-enforcement or diminshing of the magnetism of that magnet by the electro-magnetism of that electric current passing through that coil is what produces the sound in the instrument.

Now our engineers began at a very early date experimenting with bi-polar receivers. They began back as far as 1888 and 1889. It was as late as 1900 when a thoroughly satisfactory form of bi-polar receiver was produced. The first instrument was an instrument with a single piece shell, and you will notice here that the bar magnet is bent in a U shape, and there are two pole pieces, each one with a coil, and these are connected together. It makes a more powerful and efficient receiver. Long after that, about 1904 came a later type of bi-polar receiver differing from the first in that the shell was made in two pieces in order to reduce breakage of the shell itself. Then in that year 1911 or '12 came the 144 type of receiver, a unit type in which the cup and the magnet and the pole pieces are electrically welded. The trouble that occurred with some of these early instruments was due to dust getting into them and affecting their operation. This is very satisfactory in that respect, and this is the type of instrument which is and has for a great many years been the type that [fol. 8047] been put out. Now the same type of development has gone on with respect to types of receivers that have been used and are now obsolete. I have another diagram which shows 48 types of receivers that have been standard at one time or another in the past.

Q. Is that all of them?

A. Not all of them. No, there were some others. I think there were about 56 in all. This shows 48. I don't know whether you can see from there this instrument, which has

a large cap to which the head of the instrument is connected. That was the first type of operator's telephone——

Mr. Shuler: Do you mean to say that all those were developed by the A. T. and T. Staff?

The Witness: All in this photograph were.

Q. Have you a photograph of that Number 101 receiver?
A. Yes, sir.

Mr. Burr: It may be marked for identification Rhodes' Exhibit Number 78.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 78.

Q. Have you one showing the Number 122 receiver?
A. I have, showing the two forms on one picture. I also omitted to mention that I have a cross section of this 122 instrument and a picture of that, which shows its structure in a pretty clear way.

[fol. 8048] Mr. Burr: Number 122 may be marked for identification Rhodes' Exhibit 79.

And thereupon the photograph above referred to was marked for the purposes Of identification as Rhodes' Exhibit Number 79.

The Witness: The next one might be a cross section of that.

Mr. Burr: The cross section of Number 122 receiver is marked Rhodes' Exhibit Number 80.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 80.

Mr. Burr: The Number 144 receiver is marked Rhodes' Exhibit Number 81.

And thereupon the photograph above referred to was marked for the purposes of identification as Rhodes' Exhibit Number 81.

The Witness: Now in connection with that subject——

Q. Just a moment?
A. Yes.

Mr. Burr: The photograph showing types of receivers heretofore standard but now obsolete may be marked for identification Rhodes' Exhibit 82.

And thereupon the photograph above referred to was [fol. 8049] marked for the purposes of identification as Rhodes' Exhibit Number 82.

Mr. Burr: And we will offer Rhodes' Exhibits Numbers 78 to 82 inclusive in evidence.

And thereupon the photographs above offered were admitted in evidence on behalf of the Ohio Bell Telephone Company and are herewith submitted, marked respectively Rhodes' Exhibits Numbers 78, 79, 80, 81 and 82, and made a part hereof.

The Witness: I was asked if all those instruments shown on those sheets were developed by Bell engineers. In that connection, I would like to say that it is a fact that instruments have been developed outside of the Bell System, and in many respects they have been based on the Bell instruments on that particular period. Some of them have been very good instruments. I do not want in any way to appear to knock the independent instruments. At their best, when they were in good adjustment, they approached very closely the quality of our instruments. Our instruments however are designed with especial reference to the circuits in which they are used in the Bell System, and for that reason they are generally the most satisfactory instruments *than* that can be used with our system.

Mr. Dotson: You said devised by Bell interests. Is that intentionally said?—Bell rather than A. T. and T.

The Witness: I had in mind the engineers of the General [fol. 8050] Staff, working in connection with the engineers of the Western Electric Company, as all our work is carried on.

Q. What is done in the way of subjecting these instruments to life tests?

A. An important thing is to know that these instruments which are going out, literally millions of them a year, are not allowed to fall below a certain standard of efficiency. For that reason samples are regularly selected from every lot of instruments produced. They are mounted in special frames, with a receiver attached directly over the mouth

piece of the transmitter. That receive- is actuated very powerfully by a phonograph, a talking machine, so that in a period of a few weeks of continuous loud talk into them, they are subjected to a service equivalent to what they would receive in many years of actual practice, and after being subjected to that heavy load, they are tested to be sure that their efficiency has not fallen below the limit that we place that those instruments should hold up to. There are a number of details connected with that test. There is a heavy weight at intervals of about five minutes released and comes down with a heavy bang on the frame that holds these transmitters. That is intended to give them experience similar to what takes place if a receiver is replaced very violently on the desk stand or the desk stand falls over and strikes the floor. The purpose is that the instruments shall be up always to the desire- high standard.

[fol. 8051] Q. Have you made any investigation of the cost to the Ohio Bell Telephone Company in case it should provide its own instruments?

A. I have made an estimate of what it would cost the Ohio Bell Company in the State of Ohio to provide its own instruments, that is to obtain instrument service equivalent to that which it now receives from the American Company, in case it did not receive its instruments under the present license contract arrangement.

Mr. Shuler: Have you copies of that?

The Witness: Yes, sir.

Q. From your investigation of the subject, what is your opinion as to what the cost to the Ohio Bell Company would be.

Mr. Kinnison: We object to that. I do not think his opinion as to cost is in this case.

Mr. Burr: I will ask him what his judgment will be.

Mr. Shuler: I think he may show it as a matter of tabulation. He says he has the basis of it.

The Witness: I have used this tabulation as a guide to my judgment.

Mr. Burr: Go ahead.

Commissioner Poor: Is he taking into consideration here something besides the actual cost of the instrument?

The Witness: No, this is merely the instrument service

alone. It is my opinion that the annual cost per station to the Bell Company in Ohio would be slightly under one dollar per year per station to provide itself with instru- [fol. 8052] ments if it — not obtain them by the present method, and the detail of the figures on which I base my judgment are contained in this single sheet.

Mr. Burr: It may be marked for identification Rhodes' Exhibits Number 83 and is offered in evidence.

Mr. Dotson: Is that estimate based upon cost of production by the Western Electric Company or on the basis of buying them in the open market in large quantities?

The Witness: It is based on buying in the open market in large quantities.

And thereupon the paper writing above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit Number 83, and made a part hereof.

Q. Explain your computation in detail if you please?

A. This Exhibit refers to what is known as a set of instruments. One set of instruments includes a transmitter, induction coil and receiver. The present open market price of the type of instrument now used is $4.90 per set. I have assumed in this computation a first cost figure for the set of instruments of $4.50. I have taken that to be conservatively low, on the face side, with the thought that if the Ohio Company were going to replace instruments at four or five hundred stations, a lower figure than the present [fol. 8053] market price might be obtained.

Mr. Kinnison: That price you have given is list price of the Western Electric Company?

The Witness: List price of $4.90. I can give you the detail of it if you would like to have it.

Mr. Kinnison: I do not care anything about it.

The Witness: Now that is the figure which appears on line one of my exhibit. I have next computed the annual cost per set of instruments. On line three I have used an eight per cent return on the investment of $4.50, which amounts to thirty-six cents. I have used this figure of eight per cent, because in the public utility business, with the risk involved in that kind of business, a return of eight per cent appears to be about the minimum rate of return for

which money can be attracted into the business, and it is a figure which has often been allowed by commissions. In line four I have used a seven per cent credit for the account reserve for accrued depreciation, which amounts to thirty-one and one half cents. I have based that figure of seven per cent on my general knowledge and experience in connection with the business, and that has led me to the conclusion that not less than seven per cent a year should be set aside for the purpose of providing a reserve of this kind due to all causes, including the effect of changes in the art. That is not limited alone by the physical life of these instruments if they were allowed to live out their life, but [fol. 8054] by the fact that as new and improved instruments have come along, they have tended to sweep out of use the type of instruments that preceded them.

In line 5 I have used for repairs a figure of nine cents per set of instruments per year. In arriving at this figure, I have taken into account the costs to the American Company making these repairs and I have adopted this figure because it is my belief that the Ohio Company could not make these repairs for a less figure than that if they undertook to do it.

In line six I have included an item of one per cent for cost of administration. If the Ohio Company did not obtain its instruments under the present arrangements, it would have to undertake the work of purchasing instruments, of inspecting them as they were received, of keeping track of their requirements, investigating new types and new instruments. And I have thought that a figure of one per cent is a conservative figure for that expense. In line 7 I have used a two per cent reserve for contingencies, which is to care for items of expense that are not included in the previous items.

Mr. Shuler: For instance——

The Witness: If I knew what they were I should put down here what they are. I put that down because an engineer's estimate tends to overrun rather than underrun. Anybody that builds a house knows that. You think you have estimated all of the items of cost and you find the total cost is a little more than you figured on. There is no item [fol. 8055] here for development expense for developing new types of instruments. There is no item in here for patents. But as a general thing the item of contingencies is to cover for the thing if you knew what it was.

Mr. Shuler: I thought that this was based on buying it from the Western Electric?

The Witness: Precisely.

Mr. Shuler: Why would they spend anything for patents?

The Witness: Well, the Western Electric Company might continue making the same type of instruments they made before. They might not change them in any way. There might be no improved instrument. Now the sum of those items amounts to 90 cents. I am reducing this finally to the total cost per station. It is a fact in the business that more sets of instruments are required than there are stations. Instruments are required for operator's use at switchboards, for linemen and repairmen, and a certain stock of instruments is required on hand as a stock to come and go on in handling the business. It runs in general that there are about five per cent greater number of instruments by a telephone company than it has stations, due to these uses that I have just mentioned. So, applying that figure of 1.05 to the figure of ninety cents in line ten gives a figure of 94½ cents.

As I said, the American Company maintans a stock of instruments to insure continuity of supply, and for a number of years the average of that stock has been a little over [fol. 8056] six per cent of the number of outstanding instruments. So on line 13 I have taken six per cent of the $4.50 price, which amounts to twenty-seven cents and to that I have applied certain percentages to determine the annual cost of carrying this stuff. There is shown in lines 15, 16 and 17 a return of eight per cent, and — administrative cost of one per cent, and two per cent for insurance and contingencies. I have not assumed that these instruments deteriorate or depreciate while they are held in stock, because that is a reservoir into which the new instruments are put as they are made. That eleven per cent appearing in Line 18 is the 27 cents per instrument for this reserve stock, amounting to three cents more, which, added to my previous figure, gives a total annual cost per station of 97-5/10 cents. And in the light of that figure I have reached a figure at a trifle under a dollar per station per year is a fair figure.

Mr. Shuler: There is no salvage in this stuff?

The Witness: Yes, sir, that is taken care of in my seven per cent credit to the depreciation account.

Mr. Shuler: You bring that down as something else to seven.

The Witness: There is a salvage of about fifteen or twenty per cent.

Mr. Shuler: You would not count that salvage in at seven per cent; it would be considerably more.

The Witness: Something more.

Mr. Shuler: What is the life of an instrument?

[fol. 8057] The Witness: That is a rather difficult thing to say.

Mr. Shuler: What did you take in your estimate.

The Witness: My best judgment is that the life is somewhere between ten and twelve years. I should say about eleven years.

And thereupon the further hearing of this matter was adjourned until Wednesday Morning, February 27th, 1924, at 10:00 o'clock, A. M.

[fol. 8058] Wednesday Morning Session

February 27, 1924.

And also FREDERICK LELAND RHODES, resuming the stand for further examination, in chief, continued his testimony as follows:

Examined by Mr. Burr:

Q. Mr. Rhodes, at the close of yesterday afterooon session, you had described a number of services rendered by the departments of the General Staff of the American Company to the associated companies, including the Ohio Bell Telephone Company. Will you classify those services broadly?

A. Yes. They can be broadly divided into two classes: First, work on problems for all of the associated companies in which the Ohio company participates, that is, these broad developments that affect all of the companies; and, second, there is a class of specific work which is undertaken at the request of the officers of the Ohio Company relating to problems arising peculiarly in the State of Ohio about which they require consulting advice.

Q. Tell us something of the records of the Department of Development and Research and how that Department keeps in touch with new ideas?

A. Our Department has complete technical files and records extending from the beginning of the telephone business to the present time. They represent the accumulated tele-
[fol. 8059] phone experience of the world. We also have complete files of telephone patents. All important technical and scientific periodicals and other publications, proceedings of technical societies and congresses of technical people all over the world, come to us, and each copy of every periodical or report is carefully examined by specialists at the time of its receipt and referred to such people in the department as it is known would be interested in it, and in that way we keep thoroughly in touch up to the minute with all new scientific developments for the purpose of studying them to see wherein they may contain anything of benefit to the telephone service.

Q. It is true isn't it that new ideas and improvements originate in countries other than the United States?

A. Some, but not very many. I can recall very few improvements of other than distinctly minor importance that have originated in other countries. The fact of the matter is that telephone engineers and executives from all over the world come to the United States to familiarize themselves with the latest improvements that have been introduced here.

Q. Do the technical departments whose work you have described confine their work solely to improvements and to the development of ideas?

A. Why, no. There is the consulting service which is given. And we certainly do not confine ourselves to our own ideas, because we take good ideas from whatever source they may come, wherever they may arise and we undertake [fol. 8060] to apply those to the business, without regard to their origin. In a good many connections we have to acquire rights under existing patents, and that is done of course.

Q. Yes. In referring to ideas I should have specified ideas originating with members of the General Staff.

A. Did I cover that sufficiently in my answer?

Q. Yes. If some invention were to be made or some idea were to be conceived by an employee of the Ohio Bell Telephone Company, would these departments of the American Company have any function to perform with reference to such an idea or invention?

A. Yes, we are prepared to take that idea up and develop it. The men in the field know that they can send those ideas to the staff, and they know that they will be thoroughly studied and worked up. Their own organization is not set up to do that thing and it is an undesirable thing to have indescriminate experimenting going on all through a working plant. That is one of the things we try to avoid, because it has a bad reaction on the service if the working plant is being made a laboratory. We concentrate on this work in some small section of the plant and endeavor to study it extensively there.

Q. Explain if you please the relationship of the general staff to the engineers of the Ohio Bell Telephone Company?

A. Well, there is a specialization of functions. Engineers of the General Staff are in constant touch and communication with these engineers of the associated companies in the field. These engineers in the field are constructing [fol. 8061] and operating and maintaining their plants. The engineers on the staff organization are experimenting, developing and standardizing. The difference is something like that, that exists in the army, where the field officers are concerned with where to place their troops and guns and when to fire and what to fire at, and at that particular time they do not have to worry about the equipment of the troops or the design of the guns or the ammunition. That is done by the staff of the army, which is always in touch with the field and solely utilizes the field experience in the staff plans. And it is that arrangement that we follow. Now by concentrating this research and development work in the staff it means that instead of in addition to the present field engineering forces of the associated companies instead of in addition to their forces there having to be nu-bers of consulting engineers scattered around the country in each operating group, we have this one department which does the experimenting and research and consulting engineering for the entire system. It follows from that that instead of this staff being in any sense a duplication of work done in the field, it distinctly operates to prevent duplication. It does not mean that there is a difference in ability between these engineers on the staff and those in the field, but it does mean that they are engaged on different lines of problems, and the engineers of the staff are segregated in an environment where they are given the facilities for this experimental work and are devoting their lives to it. It does not

[fol. 8062] follow but what one of the engineers in the field exchanging jobs with the man on the staff would perform that work as well, or vice versa, after the men became accustomed to their jobs, and in fact there is a circulation of men from the field to the staff and from the staff out to the field.

Q. Is there any of this work of development and research which you have described which goes on without the knowledge of the engineers of the associated companies, that is to say, without their knowing about it while it is going on or afterwards even?

A. Well, yes. They are not excluded from knowing about it, that is, it is not kept as a secret from them. They come down to New York and very frequently inquire what there is going on there and they are told. But in the ordinary course of our operations there are many things that are submitted to us that we try out and find out are not suitable in the plant, and in many cases they do not know that that is going on unless they may happen to inquire if the same device is suggested to them, they will inquire of us what we know about it and we tell them. There is a great deal of the detail work in connection with some of the major projects that we are engaged on that they ordinarily would not know about until the work is completed and something definite which they can use is placed at their disposal.

Q. Is it true that the associated companies sometimes propose things to the General Staff which have already been found impractical, and if so, what happens?

A. Why, before we tell them what our experience has [fol. 8063] been we go back to our records and we find that we looked into this thing so many years ago and found for these reasons it was not advisable to recommend it, and we tell them what those reasons are, what our experience has been with it.

Q. And in that way the associated companies avoid the expense and labor of following out the idea and further investigating it?

A. That is true, and in addition to that, they are helped not to make mistakes.

Mr. Dotson: Who originated and established the coordination of these departments that you have just described.

The Witness: That has been a gradual growth and evolution that has gone on through a period of years. We had

of course a specialization of legal, accounting and technical departments, but when it first came into the business the engineering department was very small and it was not organized the way these organization diagrams show. As the work has increased, it has become necessary to continually specialize the functions further.

Mr. Dotson: It then was originated and has been established by the American Company?

The Witness: Yes, sir.

Mr. Dotson: Is it under the direction of the American Company that this shifting of engineers from the field to the experimental work and vice versa is carried on?

The Witness: It is a matter of negotiation between these [fol. 8064] people in the staff and the people in the associated companies. For instance, I recently wanted a man in my own organization and I took it up with one of the field departments of the New York Telephone Company to see if I could arrange to transfer a man to my department. And they were agreeable to it. Shortly after, one of my men left our organization to go into other work, and I applied to this same man in the New York Telephone Company to see if he could let me have another man, and he said no, that he was very short handed as a result of giving me that other man, and he didn't have anybody I could have. That is the way the proposition goes on.

Mr. Dotson: However, if he had not been short-handed, if he had had a man available, couldn't the American Company have commanded that man to transfer his activities in accordance with their wish?

The Witness: Possibly we might have, but we have never done it that way. That is, the purpose is to have a man in the position where he can do the most good to the entire system.

Mr. Dotson: This transferring of men as you have described, what is generally the purpose of that? Is that to have the man more generally informed in the work, in the field and in the experimental developments.

The Witness: Not so much that. It is to put the man in the position where he is the most needed. Now what happens frequently is that a man from the staff will be borrowed by an associated company to set some particular line of [fol. 8065] work going. Now if he has been several months with that associated company and they find out how he performs, they may say, "We would like to have that man in

our own organization. He can help us here." And then that is take- up with the man that he reports to on the staff, and — he can be spared to advantage, he will remain with that associated company.

Mr. Dotson: Well, that is taken up with the man under whose supervision he was working, simply for the purpose of enabling that party to provide someone else in his place when he is taken out, so that the work will not be interrupted nor in any way disturbed. That is really the purpose of pursuing that course?

The Witness: I am not sure I quite got the point of that.

Mr. Dotson: What I am getting at is, the American Company you say requests this transfer of the services of a man.

The Witness: Or vice versa.

Mr. Dotson: Or vice versa. For instance that is done largely in that way for the purpose of not interrupting or disturbing the work that he is carrying on, by just going ahead and taking him at once under your direct command and leaving them without anyone else to take his place. By that method you give the party a chance to supply someone in his place.

The Witness: Or we may not have anybody from that company at all. They may not be in position to have any- [fol. 8066] body come in. We always endeavor to meet the request of the associated companies for men, but we do not carry an excess force or have men trained for that purpose.

Mr. Dotson: That was what I was trying to get at, whether you had regard for the service.

The Witness: Yes.

By Mr. Burr;

Q. Isn't it true, Mr. Rhodes, that many men have gone from the General Staff of the American Company to the Ohio Bell Company and are here now and are from time to time in the employ of the company?

A. I understand that is the case, yes.

Q. And isn't the opposite also true, that men have gone from the Ohio Company to the American Company's General Staff?

A. I think that is so, but I could not recall the names of those people right now, but — is the general custom with all the associated companies.

Q. I call your attention to Mr. Crunden as an example?

A. Yes.

Mr. Dotson: Isn't it true that all of the men that are employed by the Staff are taken from the associated companies' employment?

The Witness: All of them?

Mr. Dotson: Yes.

The Witness: No, No, a very small percentage.

Mr. Dotson: Have you any way of knowing about what percentage?

The Witness: Why, no, but I should be surprised if it were more than ten per cent. I might mention there that [fol. 8067] in many of our technical departments we have men whose fundamental training is different from that, that would be suitable for men in an associated company. Now in our department of transmission development work we have a considerable number of mathematical physicists with advance degrees, men with doctor of philosophy degree, who have had highly specialized training. Those men are attracted by the particular kind of research work that we are carrying on.

Mr. Dotson: Now you take into your employment men that are graduated from colleges and universities in certain electrical lines of work?

The Witness: Yes, and we put them through an course of intensive training that lasts several months.

Mr. Burr: I think Mr. Rhodes testified day before yesterday, Mr. Dotson, although perhaps you did not hear him, that several men of that kind have gone to the American Company from universities of this state.

Mr. Dotson: I remember that.

Mr. Shuler: The same thing in 1919. He testified the same in 1919, Ohio State, Dennison and Miami.

The Witness: I think very likely because it was true then.

Q. What are the relations between the General Staff of the American Company and the Western Electric Company?

A. The Western Electric Company is the manufacturing branch of the Bell System, and their engineers work in close co-operation with the engineers of the General Staff [fol. 8068] of the American Company. The headquarters of both the General Staff and the Engineering Department of the Western Electric Company are in New York, not far from each other. Now the division of work between the two groups of engineers is this. The General Staff in this case studies the needs of the business, and in t

work it keeps in close touch with the men of the associated companies in the field, freely consults with them. Whether certain types of apparatus are to be manufactured at all is not determined by the Western Electric Company. The General Staff determines that and it determines it not from the point of view of what the manufacturer desires to sell but from the point of view of what is needed to best provide the service for the public. In work of that kind there is very important work in laying down the conditions to be met by a new piece of apparatus before the manufacturing organization is brought in. Of course they are only brought into our development work when some new device which is an article of manufacture is required. They are not brought into consultation with us on very much of our work. For instance, the traffice matters or electrical disturbances from foreign wires, or construction methods or plant operating methods, or fundamental plans. But when there is some work being done which is going to crystalize in a manufactured piece of apparatus, they do come in, and on that work the Western Electric Company does the laboratory work, what might be called the manufacturing engineering, the mechanical design, after the General Staff [fol. 8069] has done the fundamental preparatory work, studying the needs and requirements of the business. Now the object of that is that what is developed will be the thing that the General Staff has found is best suited to serve the public most satisfactorily. The Western Electric Company is told by the Staff engineers what results might be accomplished by the piece of apparatus, and their engineers and our engineers very frequently confer during the design of the apparatus. Then when the Western Electric work of design is completed our General Staff passes on the final solution. It makes tests and determines whether the apparatus that is devised is that which is best suited to perform the desired functions. If our tests show that that is so, then it is recommended as standard to the associated companies.

Q. Have you a model of line and cut-off relays?

A. I have, but I do not know that it is necessary to bring that in in that connection. My general statement has covered what it is, and that is only one example.

Q. We will omit that and also the model of the line and cut-off relays of the new type?

A. Yes.

Q. How does the General Staff make known the results of its work to the Associated companies?

A. As I have said, there is close contact and frequent conferences both by the staff engineers going into the field and the field engineers coming to the headquarters of the Staff. In addition to — there is a constant flow of information on which is sent out in the form of what we call general [fol. 8070] engineering circulars, carefully prepared statements describing various improvements in apparatus in methods. The work of the Department of Development and Research crystal-izes in what are termed bulletins, which are rather more extensive publications than the general engineering circulars. Then apparatus is frequently described in specifications which are sent out by our department. The traffic end of the work send out a series of traffic circulars. The commercial engineer also sends out commercial letters and bulletins.

In order to show the continuous nature of that work, I have just jotted down the numbers of these various forms of information that have been sent out. In recent years, and I have the information for the four years beginning with 1920 and ending with 1923, in that period of time there was sent out 463 general engineering circulars, 67 traffic circulars, 156 specifications, 121 development and research bulletins, and 156 commercial letters and circulars. That means in that four years' period these various pieces of information were coming to the associated companies at the rate of between four and five every week, which I think serves to show the continuous nature of the service.

Q. Have you a list of the titles of those circulars and letters and other information?

A. I have.

Mr. Burr: It may be marked Exhibit 84 and is offered in evidence.

[fol. 8071] And thereupon the paper writing above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company and is herewith submitted, marked Rhodes' Exhibit Number 84, and made a part hereof.

The Witness: These are given by title only and I think they will serve by the titles to show the scope of the subjects covered.

Q. Does that cover all of the subjects?
A. No, they are typical ones.

Mr. Kinnison: Are those gotten out by Western Electric or by the American Company?
The Witness: By the American Company.

Q. Have you also a bulletin on transmission equiv-lents?
A. Why, I had it around it but I think I gave it to Mr. Kositzky.

Q. Very well. We will omit that one. Have you a bulletin known as bulletin Number 3, covering the matter of sags of suspension strands of aerial cable?
A. Yes, that is a rather typical one of our very early bulletins which shows the form in which this information was put up. This shows a convenient method of arriving at the proper sag to allow in suspension strands for carrying aerial cable in order that safe loads will not be exceeded.

Mr. Burr: It may be marked Exhibit 85 and is offered in [fol. 8072] evidence.

And thereupon the bulletin last above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit Number 85, and made a part hereof.

Q. In order to shorten the inquiry, I will ask you with respect to only one more of the bulletins, namely, Bulletin Number 63 on power plant and main distributing frame grounding systems. Have you copies of that bulletin available?

A. Yes, that is a later bulletin than the other one and is a type of a rather smaller bulletin than the one that has just been put in.

Mr. Burr: It may be marked Rhodes' Exhibit Number 86 and is offered in evidence.

And thereupon the bulletin above referred to was marked for the purposes of identification and was offered and ad-

mitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit Number 86, and made a part hereof.

Mr. Shuler: When was this gotten out?

The Witness: Which one is that?

Mr. Shuler: 84. This is just the names of some of the things.

The Witness: This is just the names of some of them. [fol. 8073] I should say it was gotten out within the last year.

Mr. Shuler: The things mentioned there were gotten out over a period of many years?

The Witness: Over a period of several years. I purposely went back over a period of years to get a representative range of titles, showing the character of the work.

Mr. Shuler: How many are there.

The Witness: In 1923 we sent out 161 general engineering circulars, 15 traffic circulars, 55 specifications, 48 development and research bulletins, and 20 commercial letters, circulars and bulletins.

Q. That work is still going on is it?

A. Oh, yes, indeed. In fact up to comparatively recently there have been some 34 of the general circulars sent out during the year 1924.

Q. To what extent might we say that as a general thing the functions of the General Staff are those of a clearing house?

A. Well, I do not think that is an apt term to describe the character of the greater part of our work. There is of course a small portion of our work that is of that nature, but "clearing house" implies to me the collecting and assembling and passing out of data. Now the greater part of our work goes further than that. We analyze and compare and study and experiment and test and devise and eliminate and improve. The policy is not simply one of handing out collective information that comes in from these companies to all of the companies, but our policy in all branches of [fol. 8074] our work is not to wait until an associated company finds itself throttled and hampered as a result of its expansions, the expansion of its business, beyond a point where existing means and methods are adequate, but we aim to anticipate the conditions of growth and the new requirements that they bring about sufficiently in advance so that

we shall be able to determine and have ready for service thoroughly tried out materials, apparatus and methods when these are required, so that the orderly expansion of the business of the associated companies will not be choked. It is what you might I think aptly refer to as a policy of preparedness.

Mr. Kinnison: Does that mean, Mr. Rhodes, that your associated companies, after they have developed a certain idea or determined that a certain idea may be worthy of investigation and submit it to your General Staff, the word of your General Staff is final.

The Witness: Why they do generally accept it as final, because I think they have confidence in the work that we have done in the past in recommending it, but if I get your point, if somebody in an associated company gets an idea and makes an invention, he is at liberty to take out a patent on that invention and he can dispose of it to the American Company if he wishes or he can dispose of it to somebody else. He is under no contract to turn it in to us.

Mr. Kinnison: I did not mean it in quite that sense. The disapp-oval of the feasibility of an idea by your General [fol. 8075] Staff would prevent the further development of it by one of your associated companies?

The Witness: Not necessarily. There is no rule in regard to that. But what happens is, after we have made these tests, the man who has this idea come in and we go over it with him and tell him what we have done and see if he has any further ideas about it.

By Mr. Burr:

Q. Then after that he is free to do as he pleases?
A. He is free to do as he pleases.

Mr. Kinnison: But as a matter of fact you constitute his market do you not?

The Witness: In a large sense, yes.

Mr. Burr: But he may market his patent elsewhere if he wants to?

The Witness: Yes, he may handle it precisely as any individual could do.

By Mr. Burr:

Q. If he did handle it and develop it by himself and it turned out to be and advantageous thing for the telephone

business, would or would not your company try to avail itself of the improvement, whatever it was?

A. We would.

Commissioner Poor: In other words, in the majority of cases, you mean, Mr. Rhodes you either convince him that his plan is not feasible or practical or he convinces you that it is practical.

The Witness: That is right.

Q. Does the General Staff enforce its ideas on the associated companies? That question is in line with the inquiry [fol. 8076] which has just been going on.

Mr. Dotson: You mean generally?

Mr. Burr: Yes, generally speaking. We have been talking about patented devices or ideas.

The Witness: Well, there is no line of authority between these General Staff Departments and the corresponding departments in the associated companies. Now an official of an associated company keeps in close touch with the General Staff Department, which is working on the particular things that arise in his department, and he keeps himself always informed as to the best methods and practices that our Staff Departments have worked out in his line of work. But his specific instructions come to him from the executive offices of his own associated company, and the relation with the staff is merely a consulting one.

Mr. Dotson: Well, the American Company has the largest financial interest in these associated companies has it not?

The Witness: In most of them, yes, sir. There are two in which it has not.

Mr. Dotson: What are those two?

The Witness: The Bell Company of Cincinnati and the Southern New England Company, which operates in the State of Connecticut.

Mr. Dotson: In that sense it is of interest and importance to the American Company, and isn't it so regarded, to have the associated companies avail themselves of these improve- [fol. 8077] ments that make for economy and efficiency.

The Witness: I think it is and they do, sir, very largely.

Q. You have been speaking of some of the services rendered under the license contract. Tell the Commission if you know whether different methods have been followed from time to time in making payment for the services, and

if they have, you may state what in a general way they have been?

A. Different methods have been followed. In the beginning of the business the payment made by the associated company was fourteen dollars a year per set of instruments supplied by the American Company. That was reduced from time to time.

Mr. Shuler: May I interrupt there a minute, Mr. Burr?

Mr. Burr: Yes, Mr. Shuler.

Mr. Shuler: I want to get it clear in my mind.

Mr. Burr: Yes.

Mr. Shuler: Are those instruments that were then supplied different from what they are supplying now?

The Witness: Yes.

Mr. Shuler: It was the whole telephone?

The Witness: No, it was also the transmitter receiver and induction coil.

Mr. Shuler: Just the same parts that are supplied now.

The Witness: Yes, but they were different types of instruments.

[fol. 8078] Mr. Shuler: No, I did not mean that.

The Witness: Then after a while the payment which was made was based on the amount that was received by an associated company from the subscriber on each particular set; that is, if a set of instruments was placed at a station where the subscribers paid eight dollars a month, the amount paid to the American Company was a greater amount than on a set of instruments that they placed at a station where the payment by the subscriber was four dollars a month. Now that resulted in a very complex accounting and it was a burden to both the associated company and the American Company to keep track of those payments on individual instruments. In 1902 that complexity was avoided by placing the charge for the services upon a per cent of the gross revenue. You see the matter pf porportioning it to the amount that was received from the subscriber was a step towards the percentage of the gross revenue method of charge. It was changed over entirely on that basis in 1902. At the time it was made the payments from all of the companies from that source were reduced. That is the four and one half per cent of the gross revenue reduced the payments under what had been paid before that time.

Q. Why wouldn't it be better instead of the present

method of payment under the license contract for the Ohio Bell Company and the other associated companies to pay for the actual services rendered by the General Staff from time to time as those services are rendered.

Mr. Shuler: You are making him an expert on that phase [fol. 8079] of the whole question are you?

Mr. Burr: I think you should answer that question.

Mr. Shuler: So that we may cross-examine on that point.

Mr. Burr: I do not see any reason why he should not answer that question.

The Witness: I do not see how our work, which covers literally hundreds of different unrelated jobs, could be prorated by companies or states and charged for item by item. The only practical way that we can do seems to be to handle it broadly on the present basis. Now under this present basis or on this present basis each associated company is free at all times to come to the General Staff and get the best information, advice, and assistance obtainable without considering the cost of each one of these specivid requests. If each associated company were required to make separate payments every time it asked a question, it might be reluctant to do so and the result would be that they would tend to fall behind in efficiency.

Now we have this situation, that in many instances the same or similar questions would be asked by different associated companies, and on the specific payment ba-is there would be a tendency to duplication of charges. Motives of economy might induce each associated company that was asking a question to request that the investigation of that subject be confined to the narrowest limits which would serve its purpose. Now piecemeal investigation of questions of that character would increase the expense of the [fol. 8080] investigation as a whole to all companies and would delay its results. Motives of economy might tend to deter each company from incurring expense for work looking into the future in which it might not be apparent to that company that it had at the time any immediate interest. And further, each company would tend to be deterred from requesting by itself investigation of broad and general questions in which all companies were or might be interested, as each company might feel that all of the companies would contribute to it.

Then there are these things which I have referred to be-

fore, which are tried out and found to be unsuccessful, mistakes which are avoided, patents which are examined and rejected. It would be an impracticable thing to bill directly for work of this kind which involves negative results. The existing arrangement encourages all of the associated companies to bring to the staff all of the questions in which they are interested, and permits the most thorough and broad investigation by the staff.

Q. I think you testified on the first day of the hearing as to whether or not the American Company operates any local telephone exchanges, but in order to make sure I will ask you the question again. Does it or does it not?

A. It does not.

Q. I believe that you also described in a general way that is the long lines department of the American Company, but I will ask you again what the department is.

A. It is the department which builds, operates and main-
[fol. 8081] tains the long lines over which are handled the messages which go from the territory of one company in general to the territory of another company. I was going to say that that organization is entirely separate and independent from the General Staff organization, with the exception, I think, of three men in the legal department of the Staff who do some legal work for the long lines Department.

Q. Isn't it true that you would need your present engineering staff in connection with the operation of the long lines service, leaving out of the consideration for the moment the question of the associated companies.

A. Why we would need some of it, but not anything like the proportions in which it exists, because a great deal of the work that is done by the Staff is in connection with subjects involved in exchange operation.

Q. So that while the long lines department would need what would amount to a comparatively small portion or proportion of the service rendered, a great part of the service is necessary to the operation of the associated companies.

A. That is true. Some of the work that we do on toll-line construction is valuable both to the associated companies and the Long Lines, and that is also true of some of the work on loading and some of the work on repeaters.

Q. Yes, that is exactly so. Now can you give some fur-

ther examples of the work completed by the General Staff?

A. Yes, I have a list which relates to plant matters only. I have not included traffic and commercial problems in this, [fol. 8082] but it covers equipment and outside plant and transmission and protection subjects.

Mr. Burr: The list may be marked Rhodes' Exhibit 87 and is offered in evidence.

And thereupon the list above referred to was marked for the purposes of identification and was offered and admitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted, marked Rhodes' Exhibit Number 87.

Q. I notice Exhibit Number 87 is labeled, "Some cases of work completed." Is the list intended to represent anything near all of the cases of work completed?

Mr. Shuler: Is that kind of questtion competent? What it is intended to do is most vague and indefinite.

Mr. Burr: The question is withdrawn.

Q. Are there other cases of work completed by the General Staff covering plant matters only, and which are not included in the list set forth in Exhibit 87?

A. I think I can answer that best by saying that this list, which covers something over eighteen pages of titles, bears on the last page this statement, "Work has also been completed on about 800 other subjects."

Q. Can you also indicate some of the work which the General Staff now has on hand?

A. There is possibly some little error in this due to the fact that this list of subjects covered cases of work on hand [fol. 8083] at the beginning of this year. Now some few of these have been completed since that time, but this represented the facts of the case as of the beginning of this year.

Q. You are now referring to a list of cases of work on hand are you?

A. Yes.

Mr. Burr: It may be marked Exhibit 88 and offered in evidence.

And thereupon the list above referred to was marked for the purposes of identification and was offered and ad-

mitted in evidence on behalf of the Ohio Bell Telephone Company, and is herewith submitted marked Rhodes' Exhibit Number 88, and made a part hereof.

The Witness: I might say in connection that this, as in the case of the other list, is not complete. It covers a little over 11 pages of subjects, and the last page bears the statement that work is also on hand for more than 400 subjects.

Mr. Shuler: Do they read these things on company time?

The Witness: Why I do not believe that outside of one or two of my assistants and myself, they have ever seen a list of this kind.

Q. Based on your experience in the past and from what you know of existing conditions, that is to say, conditions existing at the present time, would you say that the art of telephone has or has not reached the point of stabilization [fol. 8084] such that the work of development and research would be of less importance in the future than it has been in the past?

A. It has distinctly not. Every improvement that we make leads to the possibility of still other improvements. As the business grows the opportunity for economy and improvements broadens out. In the last three years we have completed a great many subjects of great importance to the associated companies. I can give you a few examples of those if you like.

Q. I wish you would.

A. I haven't enough data with me to give very many of these examples from the work of other sections of the department, so I have drawn these examples quite largely from the section for which I am immediately responsible and with the work of which I am naturally the most familiar. Take the matter that I spoke of, of the extension of the use of 24 gauge instead of 22 gauge, wires smaller than 1200 pair—cables smaller than 1200 pairs, that came into use in 1922,—It really came into use the latter part of 1921, but 1922 was the first full year in which the associated companies availed themselves of that. In that year the first cost of cables on account of that work installed in the Bell System was $800,000 less than would have been the cost if the previous type had been employed.

Q. That you say was perfected and given out by the de-

partment of development and research in the latter part of 1921?

A. Yes.

Q. You may proceed?

A. Now that saving of $800,000.00 I think will be con- [fol. 8085] siderably larger in 1923, but the statistics for the use of cable for the year are not as yet available in complete from. I should suspect it would run well over a million dollars in 1923. Now we completed in 1922 work on making 24 gauge wires available for 900 pair cable used principally underground. The previous figure I gave was for aerial cables of 600 pairs and more. By the use of this fine wire in 900 pair cable, there was a first cost saving for the system of $200,000. That saving became available for the year 1923. The development of the 450 pair 19 gauge cable that I referred to yesterday or the day before first began to come into use in 1919, and it was subsequent to that time in 1920 and '21 that it grew up to a considerable use, and that has saved $250,000 a year.

Q. That is, it has saved and will probably save more every year?

A. With the increasing use of cable, yes.

Q. Yes?

A. In 1922, we made available a means for reducing the capacity unbalance in '22 and 24 gauge cables so as to permit all those small cables in exchange trunks being loaded, equipped with loading coils. The previous methods of manufacturing those cables were not such that those cables were available for loading. That alone will effect a saving of about $400,000 a year in the first cost of cables in the Bell System. The adjustment in sheath which I have described was started in 1921 and came into full effect in 1923. That has resulted in a first cost saving of $200,000.00 a year in the Bell System. The bronze drop [fol. 8086] wire which I spoke of came into use in the latter part of 1921, effecting a saving of about $175,000.00 a year in the entire system. Last year by changing our requirements for creosoting yellow pine poles to permit the use of poles that had formerly been rejected, that is, our experience in following up the effect of decay in those poles, indicated that we could accept certain types of knots that had previously been excluded as a potent source of decay, by modifying our requirements slightly in that respect a

first cost saving of about $150,000.00 a year was made in the system. I referred to the use of a light weight easily operated coal derrick to be applied to automobile trucks to be used in connection with the power wench on that truck to save labor in erecting poles, in moving poles, in pulling poles from the ground, handling cases of loading coils and work of that kind. It is conservatively estimated that when they type of pole derrick comes into general use it will result in an annual saving of more than a million dollars a year in the entire system. Work was done between 1921 and 1923 *no* more economical wiring plans for subscribers' stations, which results in a saving of approximately $300,000.00 a year in the system. Well, there are a number of items which I could read, ranging along in hundreds of thousands of dollars, some of them down to as small as $50,000.00 a year, perhaps fifteen or twenty of those items but those items I have given are typical of the kind of work that is being done right along from year to year.

Mr. Dotson: The amounts given in your answers of [fol. 8087] savings of first costs, those amounts pertain to all the associated companies in general, not to any particular one; that is right?

The Witness: That is we estimated—The estimate based on the year's consumption of that type of material in the whole system.

Mr. Dotson: Those savings pertain to the savings of only one year? And if so, what year does that refer to?

The Witness: To what we will consider a normal year, 1922 or 1923. That is, they are based on the entire consumption of material in that year.

Mr. Burr: Yes, in that particular year.

The Witness: Yes.

Mr. Dotson: There is no allocation of these savings to the Ohio Bell Company that you could refer to.

The Witness: I have not made such allocation myself, no.

Mr. Burr: We will have other witnesses whom we may interrogate on that subject.

Mr. Dotson: I might forget it then.

Mr. Burr: I hope you won't.

Q. In your opinion is it necessary for the proper handling of its business that an operating company, such as

the Ohio Bell Telephone Company, shall put itself in a position to secure to the fullest extent the results of future development and research in the telephone art?

A. It is.

[fol. 8088] Mr. Dotson: Read that question.

Question read.

Mr. Burr: I am not asking him whether it is necessary to secure results of development brought out by the American Company, but in general, in view of his knowledge of the art as it has so far progressed and the probable future requirements of the art as it expands from year to year.

Mr. Dotson: The peculiar thing about that question is that it does not seemingly throw light on anything.

Commissioner Maullar: It is just his opinion.

Mr. Dotson: It is just his opinion as to the necessity of having that. But I mean it does not throw any light on the question we are hearing at all. The question is whether it is necessary for them to have this service from the American Company.

Mr. Shuler: At this price.

Q. What would you say, Mr. Rhodes, as to the necessity for increasing as the art develops the amount available for development and research?

A. Why it seems to me that it is very desirable to have that go on, because as the subject broadens out there are vast amounts of new projects which, considering the business as a whole, it is desirable to have attacked and have improvements and economies made in those things. As the art broadens out and more subjects are investigated, it means that more people are required to do it.

Q. Has the art broadened since the year 1918?

[fol. 8089] A. It has.

Mr. Shuler: I would like to ask him on that a question, because I want to base some later questions on it. You are now capable of answering questions as to the increased number of employees and the expenses of the staff are you?

The Witness: I am as to the number of employees. I am not as to the expenses.

Mr. Shuler: Then how can he testify in answer to Mr. Burr's question, if he is not familiar with all of them; how is he competent to answer Mr. Burr's question? In other words, I want him to be just as competent to answer questions on cross-examination as he is on direct.

Commissioner Maullar: I don't see where the number of employees has anything to do with that question or the answer, if you are referring to the immediate question and answer.

Mr. Shuler: But my point is this, that Mr. Burr is asking him whether it won't render necessary greater work in the future than in the past. If he does not know how much work has been done, how much has been expended in the past, how it has increased in the past, how has he any idea what the future may bring forth in the way of increased work, increased expenses and increased employees? Those are questions I would like to be able to cross-examine on, and I am asking now for this particular reason, that I want to know whether this witness is going to be competent to answer those questions.

[fol. 8090] Commissioner Poor: If that was the effect of your question that is all right.

Commissioner Maullar: I understood the question that the witness answered to be as to his opinion of the increased employment or number of persons employed only. Is that right?

(Last two questions by Mr. Burr and answers thereto read.)

Commissioner Poor: If you are objecting to the second question, there should be a foundation laid as to whether he knows.

Mr. Burr: Well, the question has been answered and I have passed to another question. Now if counsel want to cross-examine, Mr. Rhodes on any subject, all right, but I would like to go on with my examination.

Q. Do you find it necessary in the expansion of the art to consider an increasing number of telephone problems and questions from time to time?

A. Yes, we do. It may not be competent in answering that question, but it seems to me that it is at least illuminating in that connection to consider the increase that has taken place in our technical departments which are doing this work, and I can give you the number of employees. We were talking about the year 1915. That was before the department of operation and engineering and the department of development and research were separated. They were one department then known as the engineering department. At that time we had 350 employees on that

[fol. 8091] Mr. Shuler: May I get something straight in my mind? "On that work." You mean the work you have been speaking about in the last two days?

The Witness: Yes, sir.

Mr. Shuler: That is so that it will not be said that it is something else?

The Witness: That is what I mean.

Mr. Shuler: The same work then?

The Witness: Same work and on the same line of work, but of course broadens out by adding more problems of various kinds. At the end of December, 1923, we had 892 employees.

Q. Do you know of any company or agency from which the Ohio Bell Telephone Company could obtain services similar to those which you have described at a less cost to it than the compensation paid by the Ohio Company to the American Company for the services.

Mr. Shuler: I object to the question. How does this witness know what services the Ohio Bell Telephone Company has called upon them for? If he would specify what services specifically they have rendered the Ohio Bell, then well and good.

The Court: I think the general answers of the witnesses so far have disclosed that he does not know of any cases, any services rendered or asked by the Ohio Bell, and I do not believe he can draw a comparison without that foundation.

Mr. Burr: Note an exception, and we will bring it out [fol. 8092] by another witness.

Mr. Kinnison: It is a matter of cross-examination anyhow.

Q. Did you testify on the subject of the services rendered by the American Company under the license contract which was in issue in the so-called Houston case, decided by the United States Supreme Court?

A. I did.

Q. Did you also testify on the same subject in the so-called Southwestern Bell Missouri Case, decided by the United States Supreme Court?

A. Yes, sir.

Mr. Kinnison: What do you mean? Last question.

Mr. Shuler: I do not see the materiality of it? You are not trying these cases before this Commission.

Mr. Kinnison: Are you referring to the last question, as to whether or not they should get this same or a similar service for a less cost?

Commissioner Maullar: He testified as to this four and one-half per cent contract in the Houston case, and he wants to know if he testified to the same contract in the Missouri case.

Mr. Kinnison: We object.

And thereupon the Commissioner overruled the above objection.

Q. Were the services rendered the associated company in those two cases substantially as those rendered the Ohio Bell Telephone Company?

Mr. Shuler: We object. We do not know what the serv-
[fol. 8093] ices were in that case testified to in the first place. I do not see how it has any materiality.

Commissioner Poor: Do you say the witness does not know?

Mr. Shuler: If he did know it would not make any difference.

Mr. Burr: He testified in the case.

Mr. Shuler: We do not know what he testified to in the case.

Mr. Burr: I did not ask him that.

Mr. Shuler: No, but I know what your conclusion is, that you are going to draw in argument.

Commissioner Poor: The objection is overruled.

Mr. Shuler: Note an exception.

The Witness: Yes, I testified on the services that were performed at that time.

Q. Were the services the same as those performed under the contract between the American Company and the Ohio Bell Company?

Mr. Kinnsison: I object to the question.

And thereupon the commission overruled the objection, to which ruling of the commission Mr. Kinnison noted his exception.

A. At that time, yes.

Mr. Burr: That is all for the present.

Mr. Shuler: Are you prepared to go ahead with your other witnesses?

Mr. Burr: Yes.

[fol. 8094] Mr. Shuler: If the Commission please, as far as I am concerned—I do not know what the other attorneys think about it—we can make much better time and do it much more intelligently if we will have an opportunity to gather together our questions and arrange them in a somewhat logical order, and I would prefer, if satisfactory to everyone else concerned, to let Mr. Rhodes go for the while, and we will cross-examine then after Mr. Burr has put on all of his witnesses, and cross-examine all of them in order.

Commissioner Poor: That was all arranged prior to actually beginning the case.

Mr. Kinnison: I would like to ask the witness a couple of questions.

Mr. Shuler: I should like to make this request also. Mr. Burr are you going to have anyone here who will be able to testify as to the receipts and expenditures of the A. T. and T. in these matters, and itemized account in a way allocated among Western Electric Services A. T. and T. long distance services and local associated companies, or bring the information so that we might ask about it?

Mr. Burr: I do not understand what you mean.

Mr. Shuler: I would like to know the amount of receipts of A. T. and T. from these license contracts throughout the United States, one; two, I would like to know their expenditures for these services.

Mr. Burr: Mr. Rhodes covered that for a period.

Mr. Shuler: For the year 1920, I understand, he gave us [fol. 8095] two lump sums.

Mr. Burr: Yes.

Mr. Shuler: What I would like to know is for a period of say ten years. I would like to know whether you will bring someone here to testify on that.

Mr. Burr: I don't know, Mr. Shuler at this time how long it would take to get that information together or in what shape it is available, if available at all. I make this point however, that it does not make any difference what the cost of those services is to the American Company, provided the amount paid to the American Company from the standpoint of the Ohio Bell Telephone Company is a fair price for the services rendered. That point was specifically covered by the United States Supreme Court in the Houston case.

Mr. Shuler: Oh, no, it was not, Mr. Burr. I read Mr. Justice Clark's opinion very carefully in that case.